August
2002

PUBLIC SERVICE COMMISSION OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

Final Environmental Impact Statement

Fox Energy Generation Project

Docket number 05-CE-115

Date Issued, August 2002

PUBLIC SERVICE COMMISSION OF WISCONSIN

DEPARTMENT OF NATURAL RESOURCES

Fox Energy Generation Facility

Final Environmental Impact Statement

Public Service Commission of Wisconsin
610 North Whitney Way
P.O. Box 7854
Madison, Wisconsin 53707-7854
Phone 608.266.5481 • Fax 608.266.3957 • TTY 608.267.1479
E-mail: pscrecs@psc.state.wi.us
Home Page: http://psc.wi.gov

Wisconsin Department of Natural Resources
101 South Webster Street
P.O. Box 7921
Madison, Wisconsin 53707-7921
Phone 608.266.2621 • Fax 608.267.3579 • TTY 608.267.6897
E-mail: www.ugores@dnr.state.wi.us
Home Page: http://www.dnr.state.wi.us

This final Environmental Impact Statement (EIS) for the proposed Fox Energy Power Plant and the proposals of Fox Energy Company, LLC (Fox Energy) and the American Transmission Company (ATC) to construct, operate, upgrade, and improve electric transmission lines, substations, water lines, and natural gas lines partially complies with the Public Service Commission's (PSC or Commission) requirements under Wis. Stat. § 1.11 and Wis. Admin. Code §§ PSC 4.30 and PSC 4.35. It also is progress towards compliance with the Department of Natural Resources' (DNR) requirements under WEPA and Wis. Admin. Code § NR 150.22.

By: Kathleen J. Zuelsdorff August 19, 2002

Kathleen J. Zuelsdorff
WEPA Coordinator
Public Service Commission of Wisconsin

Date

Questions about information in this final Environmental Impact Statement should be directed to:

Kenneth C. Rineer
Public Service Commission
(608) 267-1201

Or

Udaivir Singh Sirohi (Case Coordinator)
Public Service Commission
(608) 266-2806

Steven M. Ugoretz
Department of Natural Resources
(608) 266-6673

To the Reader:

This final Environmental Impact Statement (EIS) fulfills part of the requirements of the Wisconsin Environmental Policy Act (WEPA), Wis. Stat. § 1.11. WEPA requires state agencies to consider environmental factors when making major decisions. The purpose of the EIS is to provide the decision makers, other stakeholders, and the public with an analysis of the social, cultural, and environmental impacts that could result from the construction of a new power plant and its associated facilities. This document has been prepared jointly by the PSC and the DNR

The Commission decision on the merits of this project will be based on the record of public hearings that will be held at least 30 days after the final EIS is issued. These hearings should satisfy the WEPA requirements of the PSC and the DNR. The final EIS and testimony from the public hearings will be included in the hearing record. The hearing is scheduled for Thursday, October 3, 2002, at 1:30 p.m. and 7:00 p.m. The hearing will held in the Neenah Room of the Holiday Inn, 150 Nicolet Road, Appleton, Wisconsin.

If necessary, the DNR will hold separate hearings on the permit applications for air pollution control, water structures, wastewater discharge, and water loss approval.

Udaivir Singh Sirohi
Public Service Commission
P.O. Box 7854
Madison, WI 53707-7854
e-mail address: Udaivirsingh.sirohi@psc.state.wi.us

Specific questions on the EIS should be addressed to:

Kenneth C. Rineer
Public Service Commission
(608) 267-1201
e-mail address: kenneth.rineer@psc.state.wi.us

Or

Steven M. Ugoretz
Department of Natural Resources
(608) 266-6673
e-mail address: ugores@dnr.state.wi.us

Table of Contents

List of Tables

List of Figures

Contributors and Reviewers

Contributors

Public Service Commission

EIS coordination	Kenneth C. Rineer
Effects on competition	Randel A. Pilo
Engineering considerations	Kenneth J. Detmer Udaivir S. Sirohi Steven C. Leovy
Environmental considerations	Ali A. Wali Timothy B. Jones William A. Fannucchi
Natural gas considerations	Dagmar Vanek
Graphics	Jim Lepinski

Department of Natural Resources

General coordination	Steven Ugoretz, Madison - Science Services
Air permit considerations	Rajen Vakharia, - Madison Air Management
Wildlife impacts	Richard Nikolai, Northeaset Region (NER) – Wildlife Biologist
Water quality, fisheries and permits	George Boronow, NER – Lower Fox Water Basin leader (Water loss approval)
	Robert Masnado, James Schmidt, Madison – Watershed Management (WPDES standards)
	Richard Koch, NER – Water Regulation Zoning Specialist – Green Bay (water regulatory approvals)
	Daniel Joyce, Madison – Watershed management – Madison (WPDES permit review)
	Terry Lychwick, NER - Fisheries
	James Reyburn, NER –Water quality biologist

Reviewers

Robert S. Cullen, PSC
James D. Loock, PSC
Robert Norcross, PSC
Barbara Pickhardt, PSC
Jackie Reynolds, PSC
Kenneth C. Rineer, PSC
Udaivir Singh Sirohi, PSC
Leon M. Swerin, PSC
Steven Ugoretz, DNR
Kathleen J. Zuelsdorff, PSC

Executive Summary

Proposals

In October 2000, Fox Energy applied to the Commission for a Certificate of Public Convenience and Necessity (CPCN) under Wis. Stat. § 196.491(3) and Wis. Admin. Code ch. PSC 111, to construct and operate a large electric power generating facility at one of two possible sites. In March 2001, Fox Energy and ATC amended the application to include ATC as a CPCN co-applicant responsible for building and operating the proposed electric transmission interconnection facilities to be owned by ATC. The applications were withdrawn in August 2001 as Fox Energy sought a different water source for the combined-cycle power plant. In April 2002, the applications were once again submitted for Commission review.

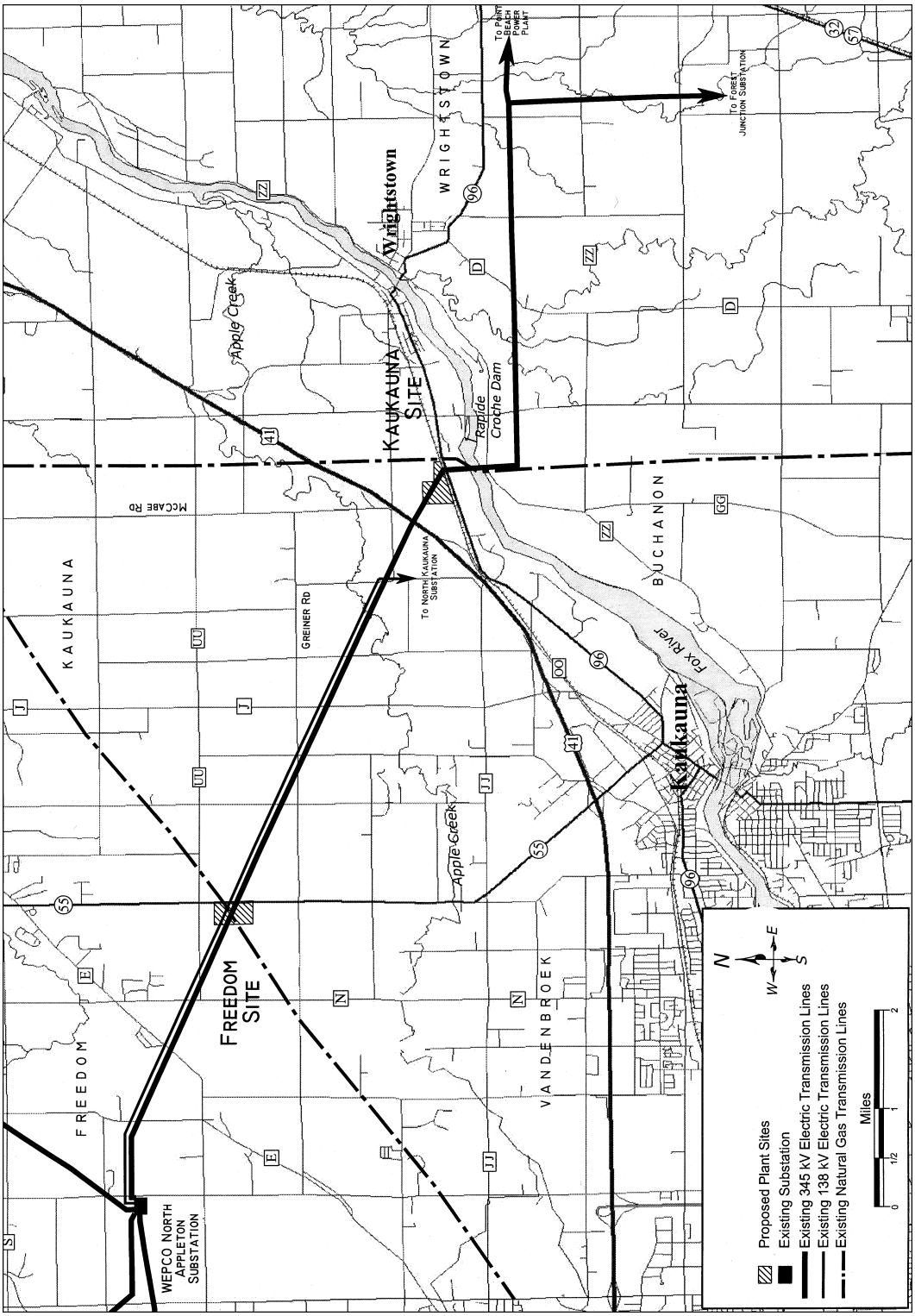
Fox Energy is a wholly owned subsidiary of MidAmerican Energy Holdings Company of Omaha, Nebraska. Fox Energy anticipates that it would enter into an operating, maintenance, and administrative services agreement with CalEnergy Generation Operating Company. CalEnergy is also a subsidiary of MidAmerican Energy Holdings Company.

The new facility would be operated as a wholesale merchant plant as defined in Wisconsin Act 204, the Electric Reliability Act, which legalized the development of wholesale merchant plants in the state. At this time, Fox Energy has signed no power purchase agreements with Wisconsin public utilities.

Project Location

Fox Energy has proposed that the power plant be located on one of the two sites in Outagamie County (see Figure 1). One site in the town of Kaukauna is located adjacent to the Wisconsin Central Limited Railroad (WCL) north of STH 96, southeast of USH 41 and west of County Line Road in the town of Kaukauna. The Kaukauna site is located in the western portion of Section 4, Township 21 North, Range 19 East. The other site is located south of the southwest corner of the intersection of County Trunk Highway (CTH) UU and State Trunk Highway (STH) 55 in the town of Freedom. The Freedom site is located in the northeast quarter of Section 27, Township 22 North, Range 19 East. The entire facility is expected to occupy approximately 30 acres regardless of site. Both sites are currently farmed.

Figure 1 **Locations of the Freedom and Kaukauna sites and existing electric and natural gas transmission facilities in the project area**



Project Description

Power plant

The power plant, at either site, would consist of two Siemens-Westinghouse 501FD combustion turbines (CTs), two heat recovery steam generators (HRSGs), and a single steam turbine with a generating capacity of 530 megawatts (MW), plus gas duct-firing equipment to gain approximately 105 MW of additional peaking capacity. Selective catalytic reduction (SCR) equipment would reduce the nitrogen oxide (NO_x) emissions further. Each turbine would be connected to its own generation and main power transformer. Steam would be condensed into water before being pumped back to the HRSG. Heat removed by the condenser would be released into the atmosphere by evaporation in cooling towers.

The two CT units and the duct burners would have a maximum natural gas fuel flow of approximately 125,000 dekatherms (Dth) per day. Fox Energy has indicated that the full-load heat input for each CT would be 2,203 million British thermal units per hour (MMBTU/hr). The total plant full-load heat input with duct firing would be 5,228 MMBTU/hr. The overall heat conversion efficiency of the proposed Fox Energy facility would be 54 percent. The anticipated operational life span would be at least 30 years. Actual operations would depend on market conditions and the market price for natural gas.

Natural gas connection

The ANR Pipeline Company (ANR) would supply the natural gas via existing interstate natural gas transmission pipelines (see Figure 1), and a new metering station. From this metering station, Fox Energy would construct, own, and operate its own pipeline to the plant site and related facilities such as heating, odorizing, and overpressure protecting devices. Gas transportation service would be under one or a combination of firm, interruptible and market balancing rate schedules. Natural gas pipelines traverse the Freedom site and lie within 230 feet east of the Kaukauna site (see Figure 1).

Water supply and discharge

Consumptive water use at the proposed facility would be, on average, approximately 4.3 million gallons per day (MGD). Regardless of site, the Heart of the Valley Metropolitan Sewerage District (HOV) would provide the water supply via a Fox Energy-built, underground pipeline. The incoming water would be stored at either plant site in a 17-million gallon holding facility, covering 7.5 acres, that would be excavated to five feet below grade and bermed up to 13 feet above grade. The facility would be covered with a floating high-density polyethylene (HDPE) cover. The plant discharge would be piped to the Fox River and discharged just upstream from the Rapide Croche dam. The water supply and discharge systems would consist of 24-inch and 10-inch HDPE pipe, respectively. From the Freedom site, the discharge and supply pipelines would share the same right-of-way (ROW) for about six miles. Beyond this point, the discharge pipeline would continue northwestward toward the Fox River by one of two routes for three to

six miles. From the Kaukauna site, a supply pipeline of about four miles and a discharge pipeline of about 0.5 mile would be needed.

Electric transmission interconnection

An interconnection study performed by the ATC determined that at least one 345 kV transmission line would be needed to connect the proposed plant to the transmission system.

There are two ways in which the power plant (located at either site) could be interconnected. One is a connection to the Forest Junction Substation via a tap into a currently de-energized line at a point north of the substation and a tap into the Point Beach-North Appleton (PBNA) 345 kilovolts (kV) line. This will be referred to as the Loop Solution. The second is a connection to the Forest Junction Substation via a tap to the de-energized line and a direct connection to the North Appleton Substation. This is the No-Loop Solution.

Each solution could utilize one of two routes:

- An Existing ROW Route that uses the existing PBNA 345 kV and Kaukauna Substation (KKSS) 138 kV right-of-way and results in a new double-circuit 345/138 kV line in place of the KKSS line next to the PBNA line (Figure 2).

- A New ROW Route that follows mostly a new path some distance from the existing PBNA-KKSS ROW (Figure 3).

ATC would construct the transmission lines using mostly H-frame structures for new single-circuit construction, but double-circuit structures could be used in the Existing ROW Route to support the existing 138 kV circuit and the new 345 kV circuit. The new double-circuit structures would be significantly taller than the existing structures for the 138 kV line. The costs are summarized in Table 1.

Table 1 Comparisons of transmission construction costs for each of the eight combinations of site, transmission solution, and route

Site	**Freedom**				**Kaukauna**			
Interconnection Approach	**Loop**		**No-Loop**		**Loop**		**No-Loop**	
Transmission line Route	Existing ROW	New ROW	Existing ROW	New ROW	Existing ROW	New ROW	Existing ROW	New ROW
Total cost	$17.3 M	$20.9 M	$19.6 M	$22.1 M	$13.8 M	$16.4 M	$19.6 M	$21.3 M

A detailed discussion of the proposed electric transmission construction and its potential impacts is found in Chapter 5.

Figure 2 **Proposed Existing ROW Route between the Forest Junction area and the North Appleton Substation**

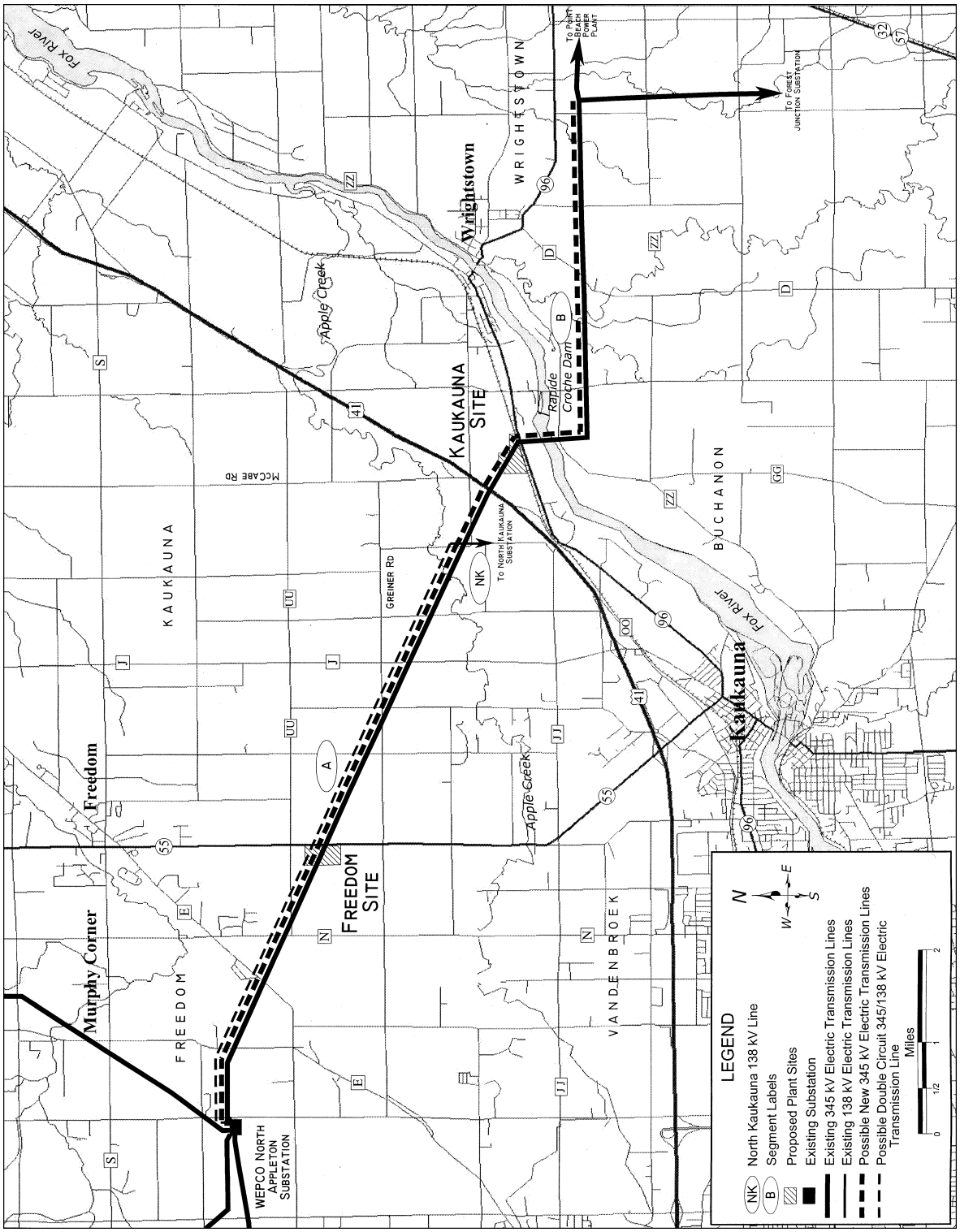
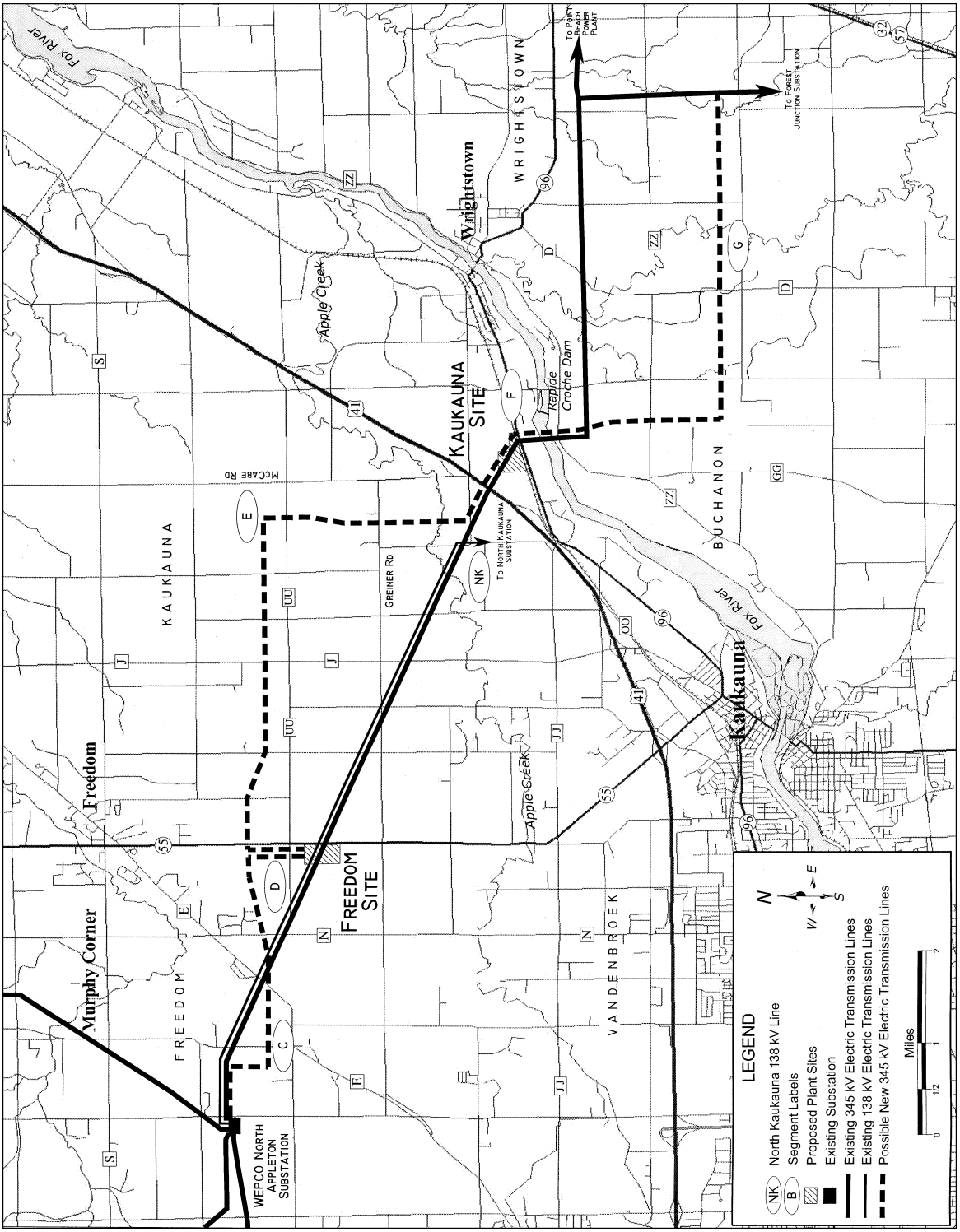


Figure 3 **Proposed New ROW Route between the Forest Junction area and the North Appleton Substation**



Environmental Issues

Air

Fox Energy has submitted an air pollution control permit application for each power plant site. Both sites are currently in attainment of the primary and secondary National Ambient Air Quality Standards (NAAQS) for all criteria pollutants. The Wisconsin Department of Natural Resources (DNR) has completed its technical review of the application. The project would have to meet conditions, but appears permittable.

Water

Drainage ditches and other small wetlands occupy parts of the Freedom site. There are none on the Kaukauna site.

The estimated limit on water flow from HOV would be 5.43 MGD. The estimated maximum water usage from HOV would be approximately 4.9 MGD. Water piped to the plant from HOV would meet HOV's wastewater permit limits. This water would be used for evaporative cooling, demineralizer makeup, and fire protection. The maximum wastewater from the facility proposed for discharge into the Fox River would be 1.1 MGD, with an estimated average discharge of 0.9 MGD.

The effluent discharged from the plant would be assigned facility-specific DNR wastewater permit limits, separate from HOV's limits, for a variety of chemical and thermal characteristics. The discharge pipe would be installed in a 20-foot by 20-foot riprap pad placed on the riverbed. The proposed discharge structure would be about 9.5 feet below the water surface. Since both sites would discharge into the same point in the Fox River, the same impacts to the river are expected to occur regardless of which site is used. Scouring of the Fox River bed would be minimal. Biological surveys at the discharge site over time have indicated that it is not likely that the project would cause significant adverse environmental impact to the river's aquatic biota.

The water supply and discharge pipelines would primarily be trenched along road ROWs, and would be along different routes for each site. At the Freedom site, the plant would require more miles of water pipeline. The supply line from HOV would be about 5.8 miles long. The discharge line would be either 7.5 miles long or 8.6 miles long, depending on the option selected. The 8.6 mile option would include 5.4 miles shared with the supply line and 3.2 miles of new ROW. At the Kaukauna site, the supply line would run about 3.7 miles, and the discharge line would run about 0.4 mile.

If either the Freedom or the Kaukauna site were selected, Fox Energy would have to secure the necessary water-related permits from the DNR and the Army Corps of Engineers (ACOE). Chapter 30 permits, from the DNR, and Section 404 and Section 10 permits from the ACOE would be required for each site in order to construct raw water supply and waste water discharge structures from each site to the Fox River. No other water supply or discharge alternatives were proposed. If the permits could not be obtained, the project would not move forward.

Other plant site issues

The community surrounding each power plant site is an area that contains farms, farmsteads, and residences or small businesses not associated with farming. Land use on the sites and surrounding the sites is mainly agricultural, but there are residences close to each site. Visual changes in the landscape would be notable at either site because of the height, size, and materials proposed for the power plant facilities. Noise mitigation at each site would be needed if the audible sound levels are to be brought down near existing ambient levels at nearby homes. The greatest sound levels would come from the cooling towers. The cooling towers would also produce fog for about 2.5 to 4.5 total hours per year along STH 55 by the Freedom site and 2.5 to 10.5 total hours per year along STH 96 by the Kaukauna site. In winter, some of the fog may contribute to road icing. Appropriately placed caution signs should advise motorists of any possible icing hazard on nearby roads.

A short comparison of other environmental issues between the Freedom site and the Kaukauna site and the power plant impacts can be found in Table 2. Site differences are discussed in detail in Chapters 3 and 4.

Table 2 Comparisons between the two proposed power plant sites for public interest and environmental values

Siting Factor	Freedom	Kaukauna
Land	Relatively flat farmland.	Relatively flat farmland.
Vegetation	Corn and soybeans plus hydrophytic plants.	Corn.
Land use	Farmland; surrounded by farmland and homes.	Farmland; surrounded by farmland, homes, and businesses.
Roads	Some congestion on CTH UU and CTH 55 during construction; impacts minimal during operation.	Some congestion on CTH U, USH 41 frontage road, Wrightstown Road, STH 96 during construction; impacts minimal during operation.
Fogging and icing potential	2.5 to 4.5 hours per year fogging along about 1,300 feet of STH 55; 15 minute to 5.5 hours per year icing along about 2,300 feet of STH 55.	2.5 to 10.5 hours per year fogging along about 2,000 feet of STH 96; 15 minutes to 3.5 hours per year icing along about 2,300 feet of STH 96.
Noise potential	More than 48 dBA at some of the closest receptors; would not comply with EPA guidelines without mitigation in addition to equipment upgrades. No low frequency vibration expected.	More than 48 dBA at closest receptors; would not comply with EPA guidelines without mitigation in addition to equipment upgrades. No low frequency vibration expected.
Distance to natural gas supply	On site.	230 feet east of site (2,500 feet total).

Potential environmental impacts of new transmission lines

It would appear that building a new transmission line would not cause a major conflict with current and future land use in this region where several transmission lines currently exist. However, there are some concerns about new lines passing through farmland and woodland, new crossings of streams, and the new visual features on the landscape. Both proposed routes are essentially cross-country in character. Potential impacts are compared between the Existing ROW and New ROW routes in Table 3.

Table 3 Environmental comparison among the four proposed electric transmission solutions for public interest and environmental values

Route Factor	Existing ROW	New ROW
Land use along ROW	Farmland, residential and roadways	Farmland, mostly
Length	Kaukauna , loop option- 4.55 miles; Freedom, loop option – 9.45 miles; Kaukauna and Freedom, non-loop option – 12.53 miles	Kaukauna, loop option – 5.95 miles; Freedom, loop option – 13.46 miles; Kaukauna, non—loop option – 16.46 miles; Freedom, non-loop option – 17.5 miles
Soils	Silty loam, silty clay loam, fine sandy loam	Silty loam, silty clay loam, fine sandy loam
Geology	No effect	No effect
Wetlands	About 2 acres of ROW is wetland: several stream crossings	2.5 acres of ROW is wetland; stream crossing
Vegetation and wildlife	No significant impact on species	Significant reduction in trees, forest crops
Existing contamination	None	None
Consistency with land use	Compatible	Compatible
Roads and utility lines	Some traffic disruption; some attention to other utilities needed	Some traffic disruption; some attention to other utilities and gas company
Visual landscape	Two existing lines present; one would be rebuilt taller	New transmission line feature in countryside
Historic properties	Nothing listed	Nothing listed
Noise	Open area – acceptable	Open area - acceptable
EMF	Moderate to high levels already exist with existing lines	New high EMF levels with new line
Aesthetics	Little impact	New impact – new feature on landscape

Required Decisions

The Commission, in reviewing Fox Energy's application for a CPCN, will decide, among other items, whether to authorize construction of the plant, whether the plant would have any effect on regional power plant competition, where to build the plant and its associated water supply

and discharge pipelines if authorized, under what conditions the plant's natural gas line would be constructed, and where to build the associated electric transmission line. If it approves the plant and the transmission line CPCNs, it will also determine whether to impose any conditions on the construction of these facilities.

The DNR will decide whether to issue the air and water permits. Without those permits, the applicants will not be able to build the proposed facilities.

1

Chapter 1 - Background

Proposal and Purpose of Project

Fox Energy Company LLC (Fox Energy) is proposing to build a new natural gas-fired combined-cycle power plant with 530 MW of nominal capacity and 105 MW of additional peaking capacity in the town of Freedom or the town of Kaukauna, both in Outagamie County. The plant has an anticipated operational life span of 30 years or more.

Fox Energy is a wholly owned subsidiary of MidAmerican Energy Holdings Company of Omaha, Nebraska. It is anticipated that Fox Energy will enter into an operating, maintenance, and administrative services agreement with CalEnergy Generation Operating Company (CalEnergy). CalEnergy is also a subsidiary of MidAmerican Energy Holdings Company.

Fox Energy sought Wisconsin sites to build a generation plant because it identified a need for additional local generation and constraints on the ability of the transmission system to support power imports.

The new facility would be qualified as an "Exempt Wholesale Generator" under the Federal Public Utility Holding Company Act and would sell electric power generated by the plant at market-based rates to utilities, power marketers, and other purchasers for resale in Wisconsin and throughout the Midwest region. Its development as a wholesale merchant plant would not be dependent on any pre-existing power purchase arrangements with public utilities. As defined in Wis. Stat. § 196.491(1)(w), a merchant plant is a power plant that may sell power at wholesale to utilities but does not provide retail electric service and is not owned by a public utility.

The company applied to the Commission for a Certificate of Public Convenience and Necessity (CPCN) under Wis. Stat. § 196.491(3) and Wis. Admin. Code ch. PSC 111, to construct and operate a large electric power generating facility and associated high-voltage electric transmission interconnection at one of two possible sites. A CPCN is required for any new power plant over 100 MW and for any new electric transmission line rated at 100 kV or above, over one mile in length, and requiring new right-of way (ROW). A CPCN for the transmission facilities to be built by the American Transmission Company (ATC) would be required as well.

General Construction Case Process

Application for Commission certification

Anyone proposing to build a power plant of 100 MW or more in Wisconsin must obtain approval from the Commission in the form of a CPCN before construction can begin. The Commission makes the final decision about whether a power plant is built and where it is sited. The Commission consists of three members, who are appointed by the Governor.

A CPCN is also required to construct any transmission line over 230 kV, or any line with a voltage of 100 kV or more, that is more than one mile long, and that would use new ROW. The local transmission provider would assume responsibility for the transmission portion of the project.

The project developers must file a detailed CPCN construction application with the Commission. Once the Commission deems an application complete under Wis. Stat. § 196.491(3), it must complete its review process within 180 days. Court approval is needed to extend the review time beyond 180 days. If the Commission does not obtain a court extension or issue a CPCN within this time period, the project is automatically approved as proposed.

DNR permitting authority

The developer of a proposed power plant must also obtain several permits from the Department of Natural Resources (DNR). The primary DNR approval needed before power plant construction may begin is the construction permit for a new source emitting significant[1] quantities of air pollutants. The permits required to disturb a navigable water body or construct a structure in it must also be issued before the construction of that part of the facilities begins. Permits required to discharge wastewater to a water body or to cause a water loss of more than 2,000,000 gallons per day (MGD) must be issued before the power plant begins to operate. DNR construction stormwater management permits are general permits applicable to all facilities with similar impacts. A steam-electric plant requires a specific operational stormwater management permit. Other DNR permits may be required for various parts of a power plant project, depending on the setting, size of facility or level of emissions, and the expected impacts.

Wisconsin Environmental Policy Act

Environmental impact statement

The Wisconsin Environmental Policy Act (WEPA), Wis. Stat.§ 1.11, requires all state agencies to consider the environmental impacts of major actions that could significantly affect the quality of human environment. An action on a combined-cycle power plant to be constructed at a new electric generation site requires preparation of an EIS under Wis. Admin. Code § PSC 4.10.

[1] In this context "significant" refers to the level of pollutants that triggers the permitting requirements.

While the Commission is the lead agency, the Commission and the DNR prepare the EIS jointly[2]. The EIS describes the project, discusses possible alternatives to the proposed action, and evaluates the project impacts on the natural and human environment.

The EIS process has several stages. First, a draft EIS is produced and circulated for comment. Those comments are considered in the production of a final EIS. Finally, a public hearing is held on the EIS. If, prior to the final decision on the project, there are substantial changes to the project proposal, or significant new circumstances that would affect the quality of the human environment in a significant manner or to a significant extent (not already considered in the draft EIS), Wis. Admin. Code § PSC 4.35, requires that a supplement to the draft EIS must be produced and circulated for comment.

Public participation in the EIS process

Under Wis. Admin. Code § 4.30(2), the Commission must solicit the participation of interested persons in ascertaining the scope of the EIS review. The Commission also distributes copies of the project application to local clerks and libraries, for inspection by the public.

The applicant, the Commission, or both entities may hold public information meetings in the project area early in the process. At these meetings, the public can learn more about the project, the applicant can improve its application, and the Commission staff can learn more about local concerns and interests before beginning to prepare the draft EIS.

The purpose of the EIS is to inform the Commissioners and the public of the potential effects of the proposed project. After a draft EIS is issued, there is a public comment period of at least 45 days. After issuance of the final EIS, there is a 30-day period of review to allow individuals to read the final EIS and prepare for the public hearing. The supplemental draft EIS was followed by a comment period of at least 45 days before the final EIS was prepared.

After the final EIS is issued, the Commission must give notice to the public and hold a public hearing in the project area. The hearing is the opportunity for the public to make their views known to the Commissioners.

Processes and Public Participation for This Case

Processes

Application filed – PSC docket 9341-CE-100

On October 25, 2000, Fox Energy filed a CPCN application for a power plant project at one of two proposed sites in Outagamie County. The CPCN application also covered associated high-

[2] DNR's administrative rule is NR 150. Section NR 150.20 (2) (f) allows joint procedures with other agencies.

voltage transmission interconnection facilities for either site. Applications for several permits were also filed by Fox Energy with the DNR at about the same time the CPCN application was filed.

The Commission determined on November 24, 2000 that Fox Energy's application was complete. The Commission distributed copies of the application to local clerks and county libraries in the project area and issued a public notification to interested and affected persons on December 7, 2000, to explain the Commission's review process and to solicit comments and questions on the project. Some comments and questions from the public were received.

Application filed - PSC docket 05-CE-115

On March 19, 2001, ATC assumed responsibility for the transmission portion of the proposed project in an Amendment to the CPCN Application filed by Fox Energy LLC (Amendment) signed by both ATC and Fox Energy. With the Amendment, ATC became a co-applicant with Fox Energy, focusing its interests on the CPCN for transmission facilities. ATC adopted the designs, routes, and construction methods that were described by Fox Energy in its CPCN application and subsequent correspondence.

The Amendment led to incorporation of ATC and Fox Energy portions of the project into one PSC docket, 05-CE-115, resulting in one co-docketed process before the Commission. The docket 9341-CE-100 was discontinued.

Application withdrawn and refiled - PSC docket 05-CE-115

In early August 2001, Fox Energy and ATC withdrew their application for the power plant and transmission facilities. Fox Energy announced its intention to investigate the use of a different water source, a new water supply system, and a new water discharge system.

On August 31, 2001, Fox Energy refiled an Engineering Plan with the DNR, and on February 1, 2002, Fox Energy refiled CPCN application materials. The Commission distributed copies of the new application materials to local clerks and libraries on February 4. On March 4, 2002, the Commission determined that Fox Energy's refiling was incomplete and listed the information that was required to complete the application.

Fox Energy filed the remainder of the supplemental information on March 21, 2002, and on March 26, 2002, the Commission distributed copies of the new application materials to local clerks and libraries. On April 25, 2002, the Commission determined Fox Energy's CPCN application to be complete. ATC reaffirmed its interest in the application. On May 6, 2002, the Commission issued a public notification to interested and affected persons to explain the Commission's review process and to solicit comments and questions on the project. Some comments and questions from the public have been received.

Remaining Commission process for this project

The remaining process steps at the Commission for the proposed project are outlined below.

A Notice of Hearing is being issued at least 30 days before the scheduled hearing date. The Commission will sponsor a hearing in the project area on the final EIS and the CPCN application. After the hearing is complete and transcripts of the hearing are received, the three Commissioners will make decisions about the project based on those hearing transcripts. The decision may be to approve, modify, or reject the proposed project. If the project is approved, the Commission will select the site for the plant, the route for the required transmission lines, and any conditions it determines should be in the construction order.

After the Commission decisions are made, an order to the applicants will be prepared and issued. Under Act 204, the order must be issued by October 22, 2002, unless the Commission obtains a 180-day extension from the Dane County circuit court.

Eminent domain (condemnation)

Under Wis. Stat. § 32.03(5), an electric utility can acquire real estate or easements by condemnation for a power plant or power line needing a CPCN, but only after the Commission has issued the CPCN. Because Fox Energy is not a utility, it has no condemnation rights under Wisconsin law.

ATC has the responsibility to construct and operate the new transmission lines that would interconnect the new plant with its system. Because ATC is a Wisconsin public utility, the eminent domain law would apply to the acquisition of transmission ROW. However, ATC has indicated that it would pursue condemnation only as a last resort.

Public participation to date

Prior to filing its original CPCN application with the Commission, Fox Energy submitted a petition to Outagamie County and to the town of Kaukauna to amend the Zoning Ordinances for the two proposed power plant sites. Public hearings and meetings were conducted by the Outagamie County Planning and Zoning Committee, the town of Kaukauna Planning Commission, the Outagamie County Board, and the town of Kaukauna Board of Supervisors.

Fox Energy had previously hosted a series of public meetings beginning in August 2000 at the Freedom and Kaukauna town halls. Direct mail invitations were sent to potentially affected landowners, and announcements were made in four major newspapers, three local television stations, and five local radio stations. Updated presentations later included information about the newly developed transmission routes that were described in the application and the original water supply and discharge pipeline to the Fox River. ATC hosted a public meeting in the area on June 14, 2001, after the initial draft EIS comment period, to share information about the proposed electric transmission line routes.

Comments were received during the 45-day comment periods after the initial draft EIS and supplemental draft EIS were issued. Those comments have been considered in the preparation of this final EIS.

Future opportunities for public participation

Comments on the EIS

The Commission and DNR staff have considered all comments received as they prepared this final EIS. Anyone who wishes to comment on this document has the opportunity to do so at the public hearing.

Public hearing on EIS and CPCN

A public hearing on the final EIS and the proposed project is scheduled for October 3, 2002, at 1:30 p.m. and 7:00 p.m. at the Holiday Inn, 150 Nicolet Road, Appleton, Wisconsin. At the public hearing, the applicant and the Commission staff, along with DNR staff involved in EIS preparation and permit review, will present prepared testimony with exhibits. The main exhibit from Fox Energy will be the project application. The main exhibit from the staff and the DNR will be the final EIS. The hearing will be the Commission's opportunity to obtain direct testimony from the public about the project.

The record of this hearing, including testimony, statements, and exhibits, will become the basis for the Commission's decisions. The EIS process, including the hearing, must be completed before either the PSC's or the DNR's decisions can become final.

Public involvement through other agencies

An air pollutant emissions source construction permit is also part of the general project review, and a subject of the EIS. The air construction permit must be issued before plant construction can begin. If a public hearing for the air permit is held it may be combined with the CPCN hearing for the plant, or held as a separate proceeding.

The DNR will also make permit-related decisions about the water loss that would be caused by the applicant's proposed use of effluent from the Heart of the Valley Metropolitan Sewage District (HOV) for process water, and the application to discharge the power plant wastewater to the Fox River. Other DNR decisions may affect Fox Energy's treatment of protected species, management of hazardous substances, stormwater management. Permits are also required under Ch. 30 of the Wisconsin Statutes to control impacts to creeks and wetlands that could be affected by construction or operation of the plant, the proposed discharge structure, and related pipelines. These decisions might not be required unless or until the plant is approved and the site is selected. They, too, could involve public hearings. Interested parties should consult the notices for those permits for procedural details.

Other state and local level permits would be needed to build or operate the plant but are not required before plant construction can begin. Some permits are required before specific plant component construction and operation. State and local agency permits and approvals needed are listed in Table 1-1.

Federal authority

Several federal permits or approvals are involved, either directly or as delegated to state agencies. For a proposed merchant plant, the Federal Energy Regulatory Commission (FERC) controls whether the plant can become a wholesale electricity generator and how its market rates might be determined. The FERC also must authorize construction of the natural gas metering station by ANR so that ANR may provide natural gas fuel to the plant. The U.S. Environmental Protection Agency (EPA) has delegated responsibility to the Wisconsin DNR to issue major source prevention of significant deterioration (PSD) and other air pollution permits. DNR wastewater discharge permits are also issued under delegated federal authority. Other federal agencies, such as the U.S. Fish and Wildlife Service or the Federal Aviation Administration, may be involved as well, depending on the site or route. Permits for altering navigable water issued under the authority of Wis. Stat. ch. 30, are coordinated with the ACOE permits under Section 404 of the Federal Clean Water Act.

National Historic Preservation Act compliance

Under federal law (Section 106 of the National Historic Preservation Act), the Wisconsin Historical Society (WHS) must be consulted by each of the federal agencies that have an interest in this project. These agencies must also contact any Native American peoples that may have an interest in the area affected by the project and any other individuals that may be affected by the loss or protection of historical, archeological, or traditional cultural properties as part of the project agency actions. Eventually, treatment of the area of potential effect would be the subject of a memorandum of agreement among all the interested parties.

The requirements of Section 106, when invoked earlier in a project review at the PSC, supersede the requirements of the corresponding state law on historic preservation, Wis. Stat. § 44.40. If Section 106 is invoked, it will cover all facets of this project, including the plant sites, the electric transmission corridors, the natural gas pipeline corridors, and any water intakes, outflows, or pipeline corridors that are required by the proposed plant. Discussions of historic and archeological considerations are in later chapters of this final EIS under the heading "Historical and Archeological Sites." Although the results of any negotiations or agreement under Section 106 can be incorporated into the final EIS, it is possible that they would occur during federal agency review processes after the project received Commission approval. If no historic properties are potentially affected, the Section 106 process might be completed before the Commission's CPCN was issued.

Contacts with Local Government

The towns of Freedom and Kaukauna and Outagamie County have been notified about the proposed project and have been acting on zoning modification and land use issues. Required local government considerations are listed in Table 1-1.

Government Permits

Permits that may be needed to build the proposed plant and its associated electric transmission line, natural gas, water, and sewer lines are listed in Table 1-1. Additional permits may be required from agencies for the electric transmission or natural gas lines, depending on circumstances and routes.

Table 1-1 Permits needed to build proposed plant and electric transmission, natural gas, water, and sewer lines

Agency	Permits and Approvals
Federal Agencies	
U.S. Army Corps of Engineers	Section 10 and Section 404 Permits.
Federal Energy Regulatory Commission	Market Based Tariff Approval.
	Exempt Wholesale Generator Status.
	Pipeline interconnection authority.
Federal Aviation Administration	Notice of Proposed Construction.
State Agencies	
Public Service Commission	Certificate of Public Convenience and Necessity.
Department of Natural Resources	Air Quality - New Source Review (PSD).
	Air Emissions Construction Permit.
	Notification of Commencement of Construction.
	Acid Rain Permit.
	Hazardous Waste/Hazardous Materials.
	Water Loss Approval.
	Chapter 30 Permit for navigable stream impacts.
	WPDES Permit.
	Threatened and Endangered Species Review.
Department of Transportation	Access Road Construction.
	Vehicle Weight Restrictions.
	Permit to work in highway ROW.
Wisconsin Historical Society	Section 106 Compliance.
	State Compliance.
Wisconsin Department of Commerce	Stormwater discharge (construction).
	Installation of Combustion Turbine and Related Equipment.
	Boiler Installation Notification.
	Construction of Building/Structures.
	Installation of Dust Filtering/HVAC.
	Construction of Plumbing Facilities.
Department of Agriculture Trade and Consumer Protection	Agricultural Impact Notification.

Agency	Permits and Approvals
County	
Outagamie County	Zoning/Land Use Compliance.
Town	
Town of Kaukauna	Zoning/Land Use Compliance.
	Local Building/Occupancy Permits.
	Road Crossing.
Town of Freedom	Local Building/Occupancy Permits.
	Road Crossing.

2

Chapter 2 – Project Description

Generating Facilities

Description of the generating facilities

Type of facilities and expected plant life

Fox Energy proposes to construct a gas-fired, combined-cycle power plant capable of being operated at either base load or intermediate load. A combined-cycle plant offers a large efficiency advantage over a conventional simple-cycle plant. This facility would also be capable of additional natural gas duct firing beyond the turbine exhaust to boost the steam turbine output during peak load requirements.

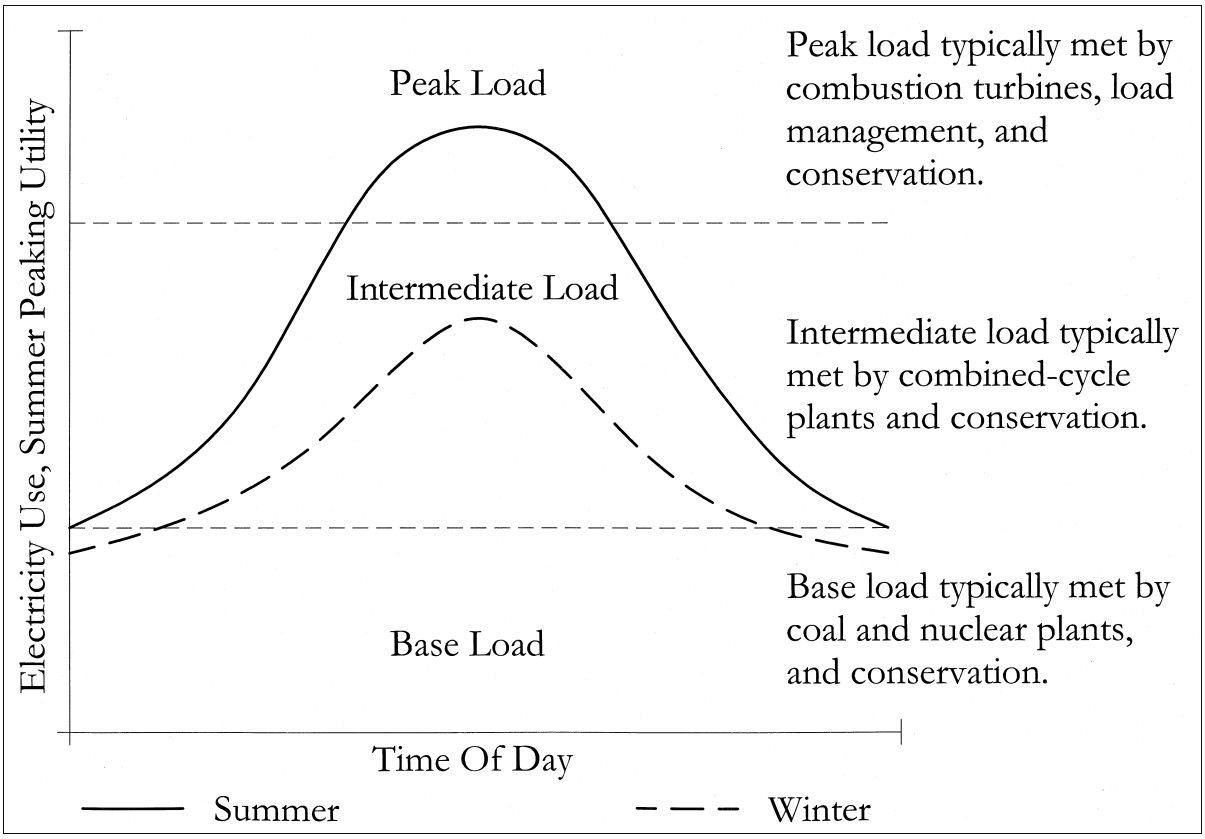
Figure 2-1 shows a typical "load curve," displaying the total amount of electricity that electric customers demand at any given time of day from a utility that experiences its demand peak in the summer. The kinds of power plants that meet the demand illustrated in the "load curve" are known as base load plants, intermediate plants, and peaking plants. Figure 2-1 also acknowledges that some electric demand can be eliminated by conservation measures.

Base load plants provide a base level of electricity to the system and are typically large generating units. Historically, nuclear or coal have powered base load plants. Base load plants tend to be operated continuously except when down for scheduled maintenance or an unplanned (forced) outage. They have a relatively high "capacity factor," typically in the range of 60 percent or greater. The capacity factor is the ratio of the amount of power actually produced in a given period to that which could have been produced if the plant operated at 100 percent power for 100 percent of the time. Base load plants usually have access to comparatively cheap fuel. That combined with the higher capacity factors generally results in a lower unit cost of power than that of intermediate and peaking plants.

Intermediate plants are plants constructed specifically for cyclic operation or they can be older, less efficient plants. They are normally operated only during times of elevated load demand and therefore have a lower capacity factor than base load plants, typically in the 25 to 50 percent range.

Peaking plants are designed to provide the additional power needed during peak system demand periods, such as those caused by air-conditioning use during summer months or when maintenance is being performed on base load plants. The capacity factor of peaking plants is fairly low, typically less than 15 percent. These plants are more economical to build than base load or intermediate load plants but are usually more expensive to operate.

Figure 2-1 Typical electric load curve with typical plants



Actual operation of the proposed plant would depend on market conditions and the market price for natural gas. The assumed capacity factors are in the range of 40-60 percent although Fox Energy anticipates operation to be in the higher range. The applicant also anticipates that the facility would have an operational life of at least 30 years.

Size of units and dimensions of plant

The proposed plant is configured with two combustion turbines (CTs), two heat recovery steam generators (HRSGs), and a single steam turbine for a generating capacity of 530 MW. In addition, approximately 105 MW of additional peaking capacity would be obtained through gas duct firing. The two CTs would be housed in one building, and the steam turbine would be housed in another. See Figures 2-2 and 2-3. The Fox Energy plant would occupy approximately 30 acres of land.

Figure 2-2 Expected layout for the proposed power plant in the town of Freedom

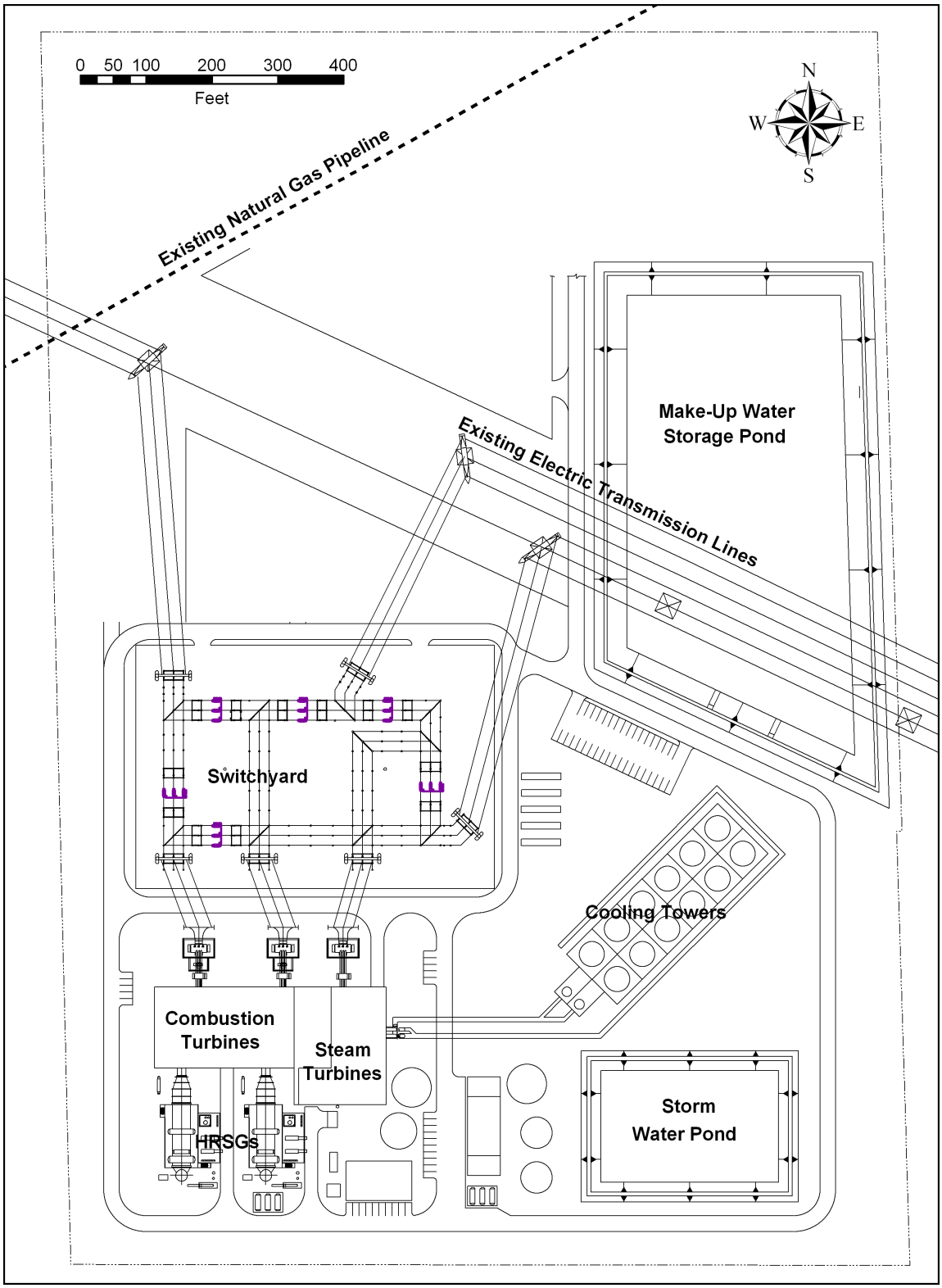
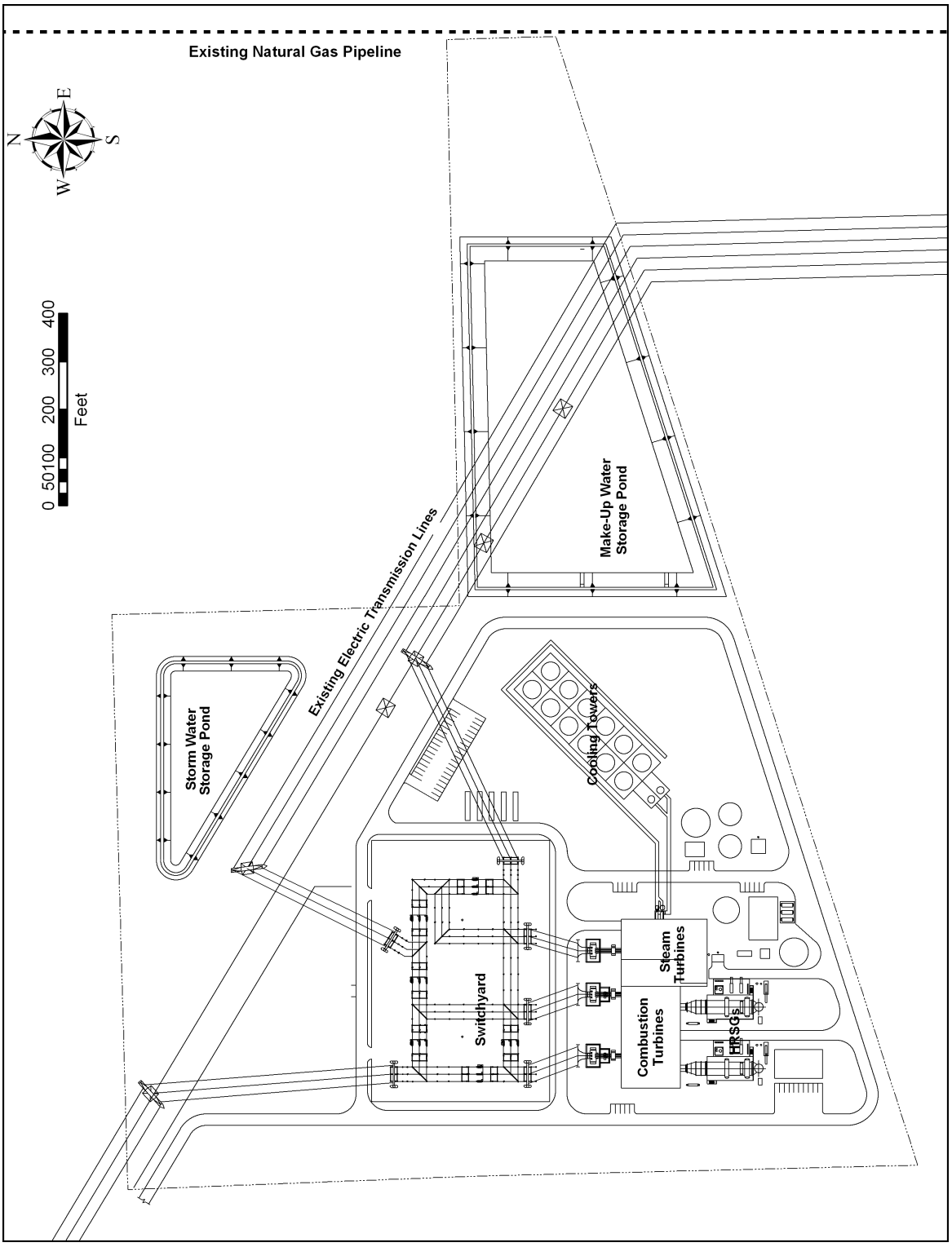


Figure 2-3 Expected layout for the proposed power plant in the town of Kaukauna



Plant fuel

Natural gas from the supply market would be used to fuel the Fox Energy facility. The two units and the duct burners are expected to have a maximum fuel flow of approximately 125,000 dekatherms (Dth) per day based on duct firing at 20 degrees Fahrenheit (F). This equates to a usage of between 18,318,000 and 41,217,000 Dth per year using capacity factors between 40 and 90 percent. By comparison, an average residential customer uses approximately 100 Dth per year.

No alternate fuel has been proposed.

Generic description of combined-cycle technology

In a combined-cycle power plant, both gas and steam turbines are utilized. Adding the steam cycle increases the efficiency of the power plant without consuming additional fuel, by generating steam from heat that would have otherwise been discharged from the CT. Steam sent to a steam turbine is converted to mechanical energy that in turn spins the attached electric generator.

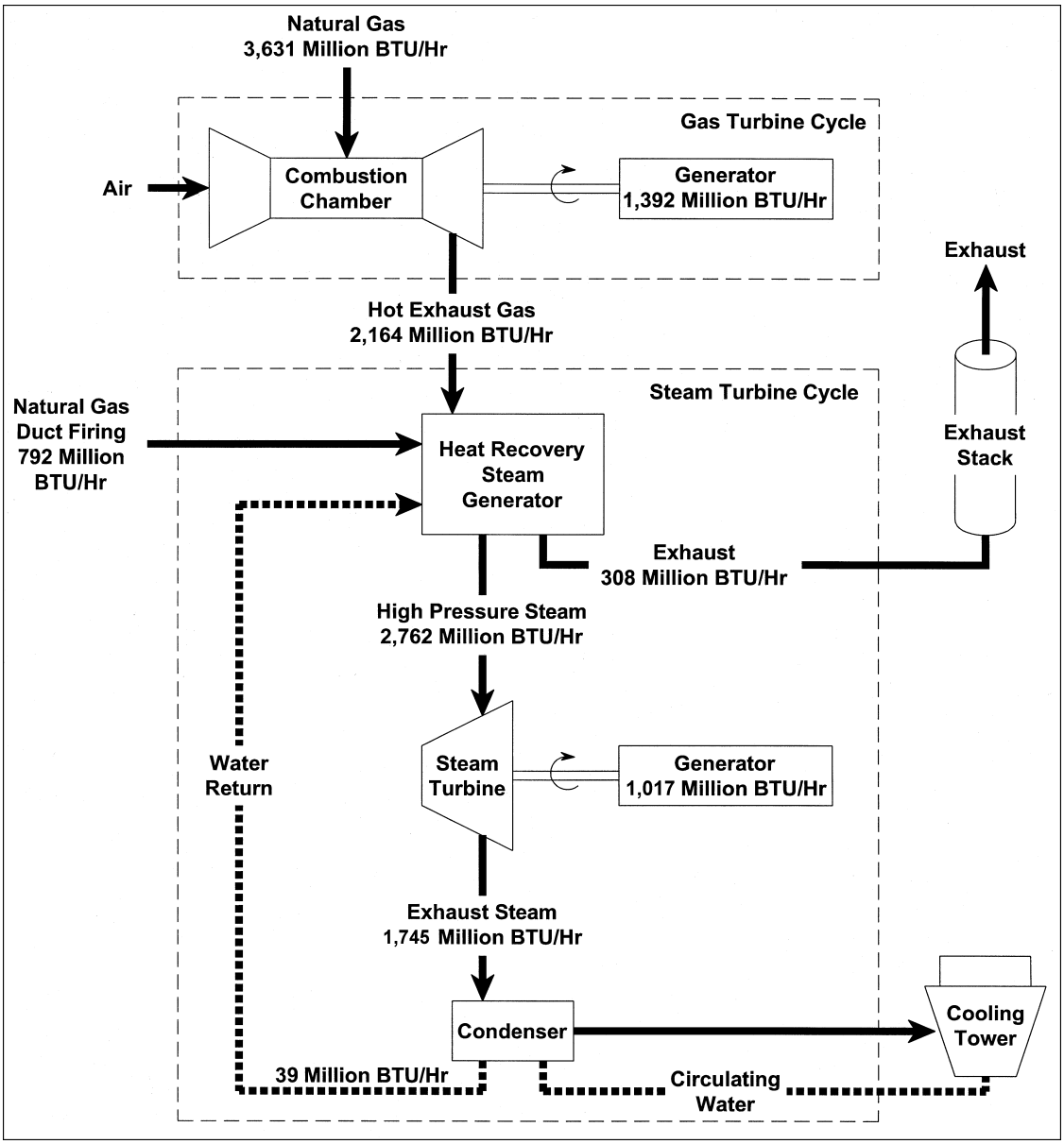
The schematic in Figure 2-4 illustrates the basic processes and equipment for the Fox Energy combined-cycle power plant.

A combined-cycle unit includes a CT component, which in turn, typically has three major components: a compressor, a combustion chamber and a turbine. Air is drawn into the compressor, compressed and discharged to the combustion chamber. The compressed air is mixed with the fuel and burned in the combustion chamber and sent to the turbine where the hot gas expands across the turbine blades, causing them to rotate. The rotating blades turn a shaft connected to a generator that produces electricity.

In a combined-cycle facility, the hot gas exiting the CT is routed to a HRSG, where the waste heat of the CT is utilized for the steam cycle. The gas cycle operates at temperatures in the range of 2,000 to 3,000°F, while the steam cycle operates at temperatures in the range of 1,000 to 1,100°F. The HRSG supplies steam to the steam turbine for additional generation of power.

After the steam passes through the steam turbine, it exits to the condenser. Condensed water can then be pumped back to the HRSG. The heat removed from the steam passing through the condenser is typically dissipated using cooling towers (as in the Fox Energy proposal), man-made cooling ponds, or naturally occurring bodies of water.

Figure 2-4 Basic processes and equipment for the proposed Fox Energy natural gas-fired combined-cycle power plant



Specific description of the proposed plant

A short description of each major component follows.

Combustion turbines

Fox Energy proposes to install Siemens-Westinghouse 501FD CTs, or their equivalent, at the proposed facility. Each CT would be rated at approximately 175 MW. The turbines have an operating speed of 3,600 revolutions per minute (RPM).

The two CTs would be located in one building but would be capable of operating independently of each other. Each CT would be attached to a generator directly.

The starting system is expected to bring the turbines up to speed for power generation in approximately 15 to 25 minutes. Full power capability is expected in less than two hours.

A carbon dioxide (CO_2) fire protection system for the CT would be part of the system supplied by Siemens-Westinghouse.

Heat recovery steam generator

The HRSG would utilize heat from the CT exhaust and transform water into steam for use in the steam cycle, as shown in Figure 2-4. Generally, the HRSG steam cycle utilizes tubes in the turbine exhaust passage for heat transfer.

The HRSG for this project would be a multiple-pressure, reheat type. The pressure sections would consist of an economizer, evaporator, reheater, and superheater. Supplemental duct firing is being considered by Fox Energy to provide additional peaking capacity. There would be no bypass dampers in the exhaust gas path, so the HSRG would need to be in service for plant operation. The exhaust path would always pass through the HRSG and not directly from the CTs to the atmosphere. The HRSG vendor has not yet been selected.

Steam turbine

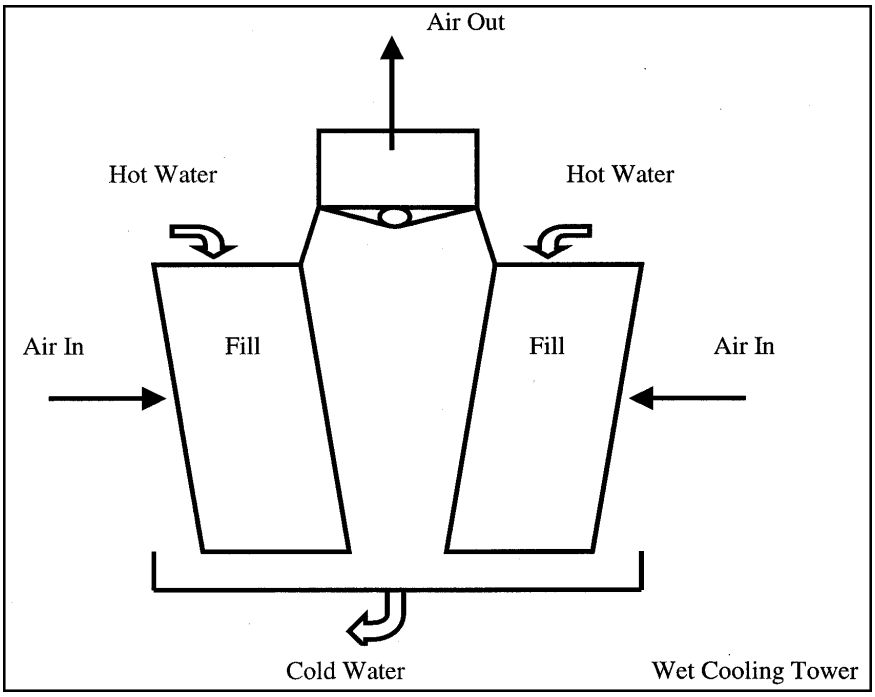
The steam turbine would obtain steam from the HRSG. Once sufficient steam is available from the HRSG, it could be brought on line and up to speed within two hours. Low-pressure, intermediate-pressure, and high-pressure sections would all be on one rotor. The turbine would attach directly to its own generator. The turbine vendor is not yet selected.

Cooling towers

Steam exiting the steam turbine would be condensed into water before being pumped back to the HRSG. The steam would be turned to water through the removal of heat by transferring it to cooling water in the condenser. The heat removed by the condenser would be released into the environment through the use of cooling towers.

A conventional cooling tower uses "wet" evaporative cooling to dissipate the heat. (See Figure 2-5.) In a cooling tower, the water exiting the condenser is pumped to the top of the tower and cascades to the bottom of the tower through packing media (also known as fill). Air is drawn from outside the tower through the packing media, where evaporation transfers heat and moisture to the air from the cascading water.

Figure 2-5 Basic process in a conventional cooling tower with wet evaporative cooling



The moist air exiting the top of the tower (Figure 2-5) is typically invisible during warm weather. In colder weather, the air exiting the cooling tower becomes a visible plume if the ambient air temperature cools the air leaving the tower below its dew point. The plume persists until the air exiting the tower sufficiently mixes with the cooler, dryer air surrounding the tower. If the plume returns to ground level prior to dissipating, it can cause problems such as localized fogging or icing of downwind structures and roadways. The potential for these problems is discussed in Chapters 3 and 4 under "Fogging and Icing."

Water storage facility

Process and cooling water entering the power plant would be stored in a 17 million gallon water storage facility. Its location and relative size are shown in Figures 2-2 and 2-3. The storage facility would consist of an earthen berm pond with a high-density polyethylene (HDPE) liner. A floating cover, also of HDPE, would cover approximately 7.5 acres. Fox Energy would need a reservoir of this size to ensure that an adequate supply of water would be available for summer peak operations.

This type of water storage facility would be the first of its kind for a Wisconsin power plant.

Other large water tanks would be on-site. Though large, they would be much smaller than the water storage facility. Water from the storage pond would be pH adjusted if necessary before entering a water storage tank. Most of the water would be treated for use in the cooling towers. Some water would require greater purification and would be filtered, demineralized, and stored

in a specified storage tank for demineralized water. This demineralized water would be used for steam cycle make-up, power augmentation, and various other purposes during plant operations.

Generators

A generator would be connected to each turbine and electrically connected to its associated main power transformer. The generators would be synchronized at 3,600 RPM. Each generator would be totally enclosed and air-cooled. Air-to-water heat exchangers in the base of the generator would remove the generator heat loss. This type of generator typically has a high reliability.

Main power transformer

One main power transformer for each generator would be provided. The three main power transformers would be connected into the switchyard. Efficiencies of 99 percent for transformers of this type are common. The voltage would be stepped up from 18 kV to 345 kV.

Operating characteristics of the plant

Fox Energy has indicated that the full-load heat input for each CT would be 2,203 MMBTU/hr. The total plant full-load heat input with duct firing is expected to be 5,228 MMBTU/hr.

Duct firing provides additional capacity for peaking operations. Variable inlet guide vanes installed on the CTs provide maximum operating efficiency for the control range of the turbine (from 70 percent to full load).

Efficiency and heat balance

The overall efficiency of the Fox Energy power plant is expected to be 54 percent (LHV)[3]. During duct firing, the operating efficiency is expected to drop to approximately 50 percent. In comparison, existing base-load coal plants in Wisconsin typically have an overall efficiency of approximately 30 percent.

The heat balance for the plant is shown in Figure 2-4**.**

The CT would use approximately 35-38 percent of the energy from the natural gas fuel to produce electricity. The remaining energy would become heat that would be exhausted to the HRSG. The HRSG would transfer approximately 45 percent of the total energy into steam. About 20 percent of the total energy would be exhausted up the stack as heat.

Steam from the HRSG would drive a steam turbine to convert additional energy into electricity. This would boost the overall plant efficiency to approximately 54 percent. Not all of the heat transfer in the HRSG is utilized in the steam turbine. A percent of total heat input would be emitted to the atmosphere as heat through the cooling towers.

[3] LHV = Low Heating Value

At average conditions of 44°F and 73 percent relative humidity, the CT would have an expected heat rate of approximately 10,400 BTU/kilowatt-hour (kWh) without the HRSG. Combined-cycle operation would result in a heat rate of approximately 6,350 BTU/kWh.

Steam sale issues

Fox Energy states that there are no steam customers for the plant at this time. The water would cycle through the plant as steam and eventually be discharged to the Fox River as water or emitted as vapor or a visible plume through the cooling towers. The energy not used by the plant to make electricity would be emitted to the atmosphere as hot air through the exhaust stack and water vapor through the cooling towers.

Electric reliability considerations

Hours of operation

Fox Energy expects the plant to operate as an intermediate load plant as much of the time as possible. See the section at the beginning of this chapter for a description of how the unit would be operated.

Outages

Planned outages would relate to inspections based on a combination of hours run and start-up cycles. Increasing numbers of startup cycles would increase the equivalent operating hours and thus increase the inspection needs from what is discussed here. The CT vendor recommends that the CT inspection occur annually, and estimates one week of outage. The hot gas path would be inspected every three years, with an outage of one to two weeks. The entire CT would be overhauled every six years with an outage of three to four weeks. The steam turbine inspection would be expected to occur annually with an outage of seven to ten days. A major overhaul is recommended every five to seven years, requiring an outage of approximately 30 days. Outages for the generator would be less frequent and typically occur during turbine inspections.

Fox Energy would likely coordinate the above outages for economic reasons. The inspection intervals may vary depending on how much the plant is operated (the capacity factor) and various unit design specifics. Any required repair or replacement might add to the outage duration.

Reliability

Wis. Stat. § 196.491 (3)(d)3 requires the Commission to consider reliability of the electric system in its determination of whether a project proposed for a CPCN is in the public interest. A new power plant would become part of the electric system. Power plant reliability relates in large part to the design or location of the facility.

Factors affecting potential reliability

There are several factors related to the project that could be factors in potential reliability.

- The choice of fuel and back-up fuel, if any. Natural gas is discussed later in this chapter.
- Restrictions on operation specified within the DNR air permit. The DNR air pollution control permit issues are discussed for each site under "Air" in Chapters 3 and 4.
- Restrictions based on the DNR water use or discharge permits. The DNR water permit issues are discussed for each site under "Water Resources" in Chapters 3 and 4.
- The potential impacts on the existing electric transmission system and the modifications to that system that might be needed. The related electric transmission system issues are discussed later in this chapter and in Chapter 5.
- Equipment availability and maintenance.

Implications of natural gas use

Reliance on natural gas as a primary fuel for generation of electricity continues to increase across the nation and in Wisconsin. If all currently proposed new generating plants were approved and constructed, natural gas would account for over 10,000 MW, or 51 percent[4], of Wisconsin's electric generation capacity by the end of 2005. (This includes all of the CPCN applications approved and currently under review by the Commission.[5]) Figure 2-6 shows Wisconsin's current and proposed electric generation capacity by fuel type.

If merchant plant developers are correct in estimating the capacity factors of the proposed plants, Wisconsin will see a large increase in the use of natural gas for electrical generation. The resulting natural gas consumption for electric generation could increase from 22,000 dekatherms (22 billion BTU) to over 160,000 dekatherms (160 trillion BTU) if these new plants are built and run as anticipated.

Annual natural gas consumption in Wisconsin for industrial, residential, commercial, and generation of electricity uses is presently 400,000 dekatherms (400 billion BTU). Natural gas consumption by the proposed gas fired plants could increase total state consumption by 35 percent in just a six-year period. This growth in demand would be unprecedented as gas consumption increased only 21 percent over a 30-year period from 1970 to 2000.

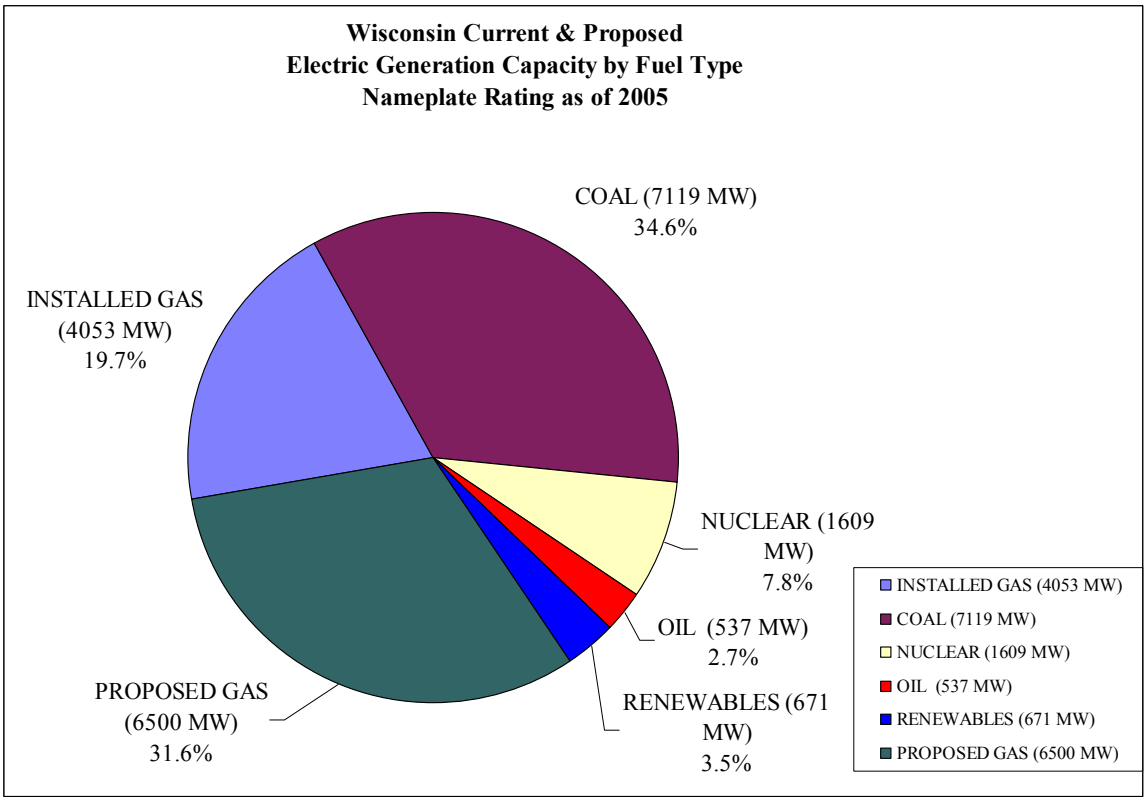
---

[4] Gas (19.7%) + Planned (31.6%) = 51%

[5] Badger Gen-Pleasant Prairie, El Paso-Muskego, Fox Energy-Kaukauna, Calpine-Riverside, Mirant-Plover, WPS-Pulliam CT, Rainy River-Superior, Calpine-Sherry, Calpine-Fond du Lac, MGE-UW Madison, MidWest Power-New Berlin, and WE-Port Washington (initial 545 MW unit).

Wisconsin now imports in excess of 15 million MWhs (over 20 percent of its electric energy) annually. Historically, Wisconsin relied on surplus baseload capacity in Illinois or coal-fired generation from the West to set market prices. With these plants no longer available, Wisconsin must purchase power from a market that relies heavily on natural gas fired generating units. Merchant power developers seeking to build in the state are expecting that it will be more economical to produce power in Wisconsin and thus an increase in natural gas consumption in Wisconsin is a possibility. It is uncertain, however, if all of these plants will be built.

Figure 2-6 Wisconsin current & proposed electric generation capacity by fuel type



Peak gas flow for electric generation in Wisconsin could also more than double from a value of 1,100,000 dekatherms per day in 2000 to a 2010 level of 2,600,000 dekatherms per day. Again, this peak gas flow and consumption may not be realized if some of the proposed generation is not built.

During summer peak periods, enough natural gas and the pipeline capacity to deliver the natural gas is expected to be available because little natural gas is used for heating. However, during the winter electrical peak, there may not be enough pipeline transportation capacity available to deliver natural gas to gas fired generation plants under firm, non-interruptible delivery contracts. This raises electric system reliability issues.

Over 80 percent of the natural gas transported into Wisconsin is carried by one interstate pipeline operator and much of that natural gas flows through a single compressor station. An outage of either

of those facilities could drastically reduce natural gas availability in Wisconsin. A new interstate pipeline approved by the FERC in 2001 and currently being designed and constructed in southeastern Wisconsin will reduce the concentration of gas deliveries by Wisconsin's largest pipeline operator.[6]

Location alternatives

Fox Energy has proposed that the power plant be located on one of two sites in Outagamie County. Both sites are currently farmed. One site is located adjacent to the Wisconsin Central Limited (WCL) railroad to the north of STH 96, southeast of USH 41 and west of County Line Road in the town of Kaukauna. The other site is located south of the southwest corner of the intersection of CTH UU and STH 55 in the town of Freedom. The two sites will be discussed at length later in this document.

Originally, Fox Energy identified six potential power plant sites. The following sections discuss the criteria and the reasoning used by Fox Energy to identify the six sites, screen out four, and select two sites for proposal.

Applicant's site selection criteria and process

Fox Energy's search and evaluation process included eight criteria:

1. Proximity to a natural gas supply.
2. Proximity to the existing electric transmission system.
3. Proximity to water supply.
4. Proximity to environmentally sensitive receptors.
5. Distance from such manmade features as residential neighborhoods and airports.
6. Availability of sufficient land.
7. Topography.
8. Site zoning designation.

Based on these initial screening criteria, Fox Energy selected potential sites for more detailed evaluation. Principal considerations at the detailed evaluation stage were as follows:

1. The ability to obtain natural gas in sufficient quantities and pressures required for normal operation of a combined-cycle plant.
2. The existence of electric transmission constraints that would interfere with the delivery of power from the site.
3. The openness of the local community to a proposed combined-cycle power plant.

[6] The proposed Rainy River/Superior plant would be supplied with natural gas via a different interstate pipeline system.

Evaluated sites

Fox Energy conducted a screening process as a private business activity. Four sites considered by Fox Energy but not proposed in its application to the Commission are discussed below, along with Fox Energy's reasons for their rejection.

Wrightstown site

This site was located in Section 9 of the town of Buchanan, Outagamie County. It is traversed by 345-kV transmission line and a high-pressure gas line. None of the landowners at this site were willing to sell property for construction of the facility.

Forest Junction site

This site was located near the Forest Junction substation in the town of Woodville in northern Calumet County. Water at this location was evaluated as being difficult to obtain, while access to gas was approximately six miles away.

Ellinwood site

This site was located in the town of Nekimi in Winnebago County. It was rejected because it was close to an airport facility and cooling water would be difficult to obtain. There also was a less-than-desired capacity for gas and electric transmission.

Fond du Lac site

This site was located in the town of Fond du Lac in Fond du Lac County, southeast of the city of Fond du Lac. This site was rejected because of a potential lack of capacity on existing transmission lines and the local natural gas system. Access to water at this site was also found to be difficult, as was the ability to discharge cooling water.

Proposed sites

Kaukauna site

This site was selected because it was a preferred location with respect to transmission (existing 345-kV line), natural gas (existing 30-inch pipeline) and cooling water (Fox River). This site is located next to a railroad line and in an appropriately zoned location.

Freedom site

This site was selected for many of the same reasons as the Kaukauna site. However, water supply for cooling is further away than at the Kaukauna site. The site was and continues to be zoned agriculture, despite an effort by the applicant to get it rezoned.

Construction Activities and Schedule

Construction of the proposed power plant cannot be started until Fox Energy receives. Commission approval of the project and the DNR air permits. If all local, state, and federal permits are granted in 2002, Fox Energy expects the plant to be in service in 2005.

Major construction activities would occur on site or adjacent to the site. The two-year construction schedule would include the following construction activities:

1. Site survey.
2. Soil and rock borings for geotechnical design, requiring a mobile drilling rig.
3. Installation of facilities needed for temporary construction water supply, with connection to the new water supply.
4. Installation of temporary wood support poles needed for temporary electric power and telephone service for the plant construction area.
5. Site clearing and preliminary grading, requiring heavy earth-moving equipment.
6. Construction of permanent plant perimeter fencing.
7. Construction of areas for contractors' trailers, materials and equipment set-down and staging, and parking.
8. Construction of a temporary roadway into the site construction area.
9. Trenching and backfilling for all underground utilities within and adjacent to the site (natural gas, telephone service, raw water supply, potable water supply, storm sewer, and sanitary sewer).
10. Construction of a gas metering and control station.
11. Construction of an outfall and discharge structure at the Fox River.
12. Soil sub-base preparation and construction of equipment and building foundations.
13. Installation of major equipment and tanks.
14. Construction and erection of facility buildings.
15. Installation of all supporting utility systems.
16. Installation of electric transmission power transformer and substation.
17. Erection of CTs, generators, and exhaust stacks.
18. Removal of temporary access roads and other temporary facilities.
19. Paving of primary access road and main facility parking and access areas.
20. Final grading, landscaping, seeding, and mulching.

Auxiliary Facilities - Fuel

Natural gas source

The proposed plant is a natural gas-fired combined-cycle facility. No backup fuel system is proposed. Natural gas would be obtained on a competitive basis from the natural gas supply market. ANR owns and operates existing interstate natural gas transmission pipelines located at or near either of the two proposed sites in the town of Freedom and the town of Kaukauna. The gas would be transported by ANR to a new metering station. From this metering station, a new gas line would be built to the plant. Fox Energy would construct, own and operate this new

pipeline and its related facilities, such as heating, odorizing and overpressure protecting devices. The natural gas would also flow through a moisture separator and fine filter to remove any particles of dust.

The gas transportation and supply contracts for the proposed project are not yet finalized. A network of interstate transmission pipelines moves natural gas from production areas to where it is used. Natural gas utilities and large industrial customers, among others, contract with interstate pipelines for the right to use a portion of the pipeline's capacity to ship gas. Fox Energy would be responsible for arranging the interstate pipeline transportation capacity for the proposed project. It plans to take gas transportation service under one or a combination of firm, interruptible and market balancing rate schedules. Pipeline capacity rights are generally of two types, firm and interruptible. Firm capacity allows the transport of a given amount of gas during the term of the contract. Fox Energy has indicated that ANR will not enter into firm service agreements with the shipper unless ANR has enough available capacity or is adequately expanded to support the proposed plant. Interruptible capacity, on the other hand, allows the transport of a given amount of gas on a "space available" basis. A gas shipper transporting under an interruptible contract must stop its shipments of gas when the pipeline's capacity is fully utilized, generally during the coldest periods in the winter. After Fox Energy finalizes its power sales, the character of the gas service can be stipulated and the actual gas firm entitlement can be adequately analyzed in order not to have an adverse impact on the integrity of the interstate pipeline system.

Gas supply procurements, whether outsourced or acquired directly by Fox Energy, would be planned to match the transportation capacity portfolio.

Jurisdiction over natural gas facilities

Some portions of the natural gas facilities necessary for the proposed Fox Energy project would be subject to state jurisdiction and others would be subject to federal jurisdiction.

The natural gas pipeline to be built by Fox Energy, from its proposed power plant to the existing pipeline owned by ANR, would be under the jurisdiction of the Commission. Construction authorization of this pipeline would be included in a CPCN approving construction of the power plant. The natural gas facilities built by Fox Energy would be designed, constructed, operated and maintained in accordance with state and federal pipeline safety regulations, including Wis. Admin. Code ch. PSC 135 and 49 CFR Part 192. These safety regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures.

The natural gas metering station to be built by ANR would be subject to federal jurisdiction. ANR would need construction authorization from the FERC. The metering station would be designed, constructed, operated and maintained in accordance with the applicable federal pipeline safety regulations, including 49 CFR part 192. It is not expected that ANR would apply to the FERC for the necessary construction authorization until after Fox Energy has received a CPCN from the PSC approving construction of the proposed power plant. If needed,

additional ANR system upgrades providing system integrity would be subject to the review and approval of the FERC.

Pipeline construction

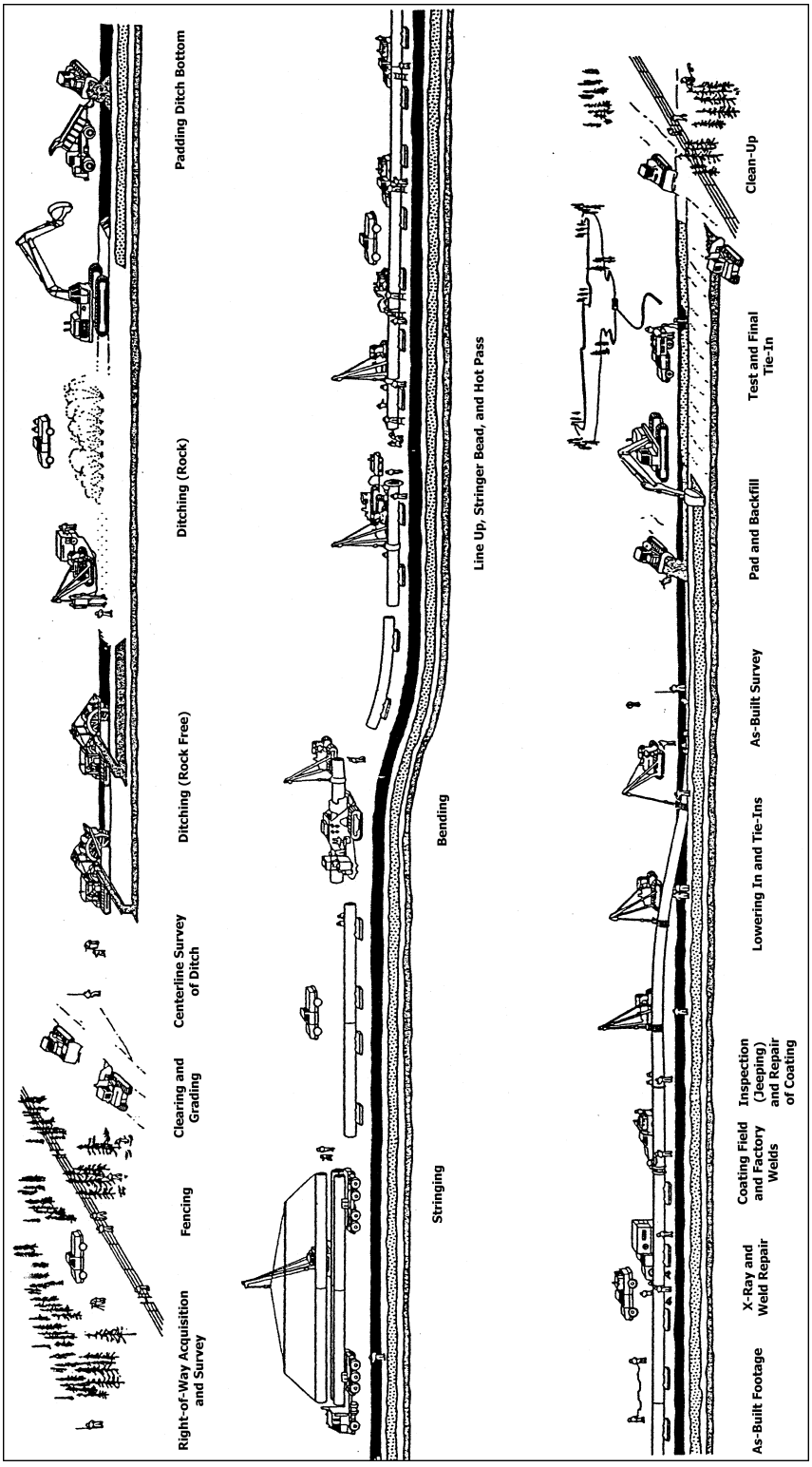
The typical sequence for pipeline construction is composed of specific activities that proceed in the manner of an outdoor assembly line using standard techniques and equipment (see Figure 2-7). These operations collectively include clearing and grading, trenching, stringing, pipe preparation (bending, welding, coating, lowering-ins, and tie-ins), backfilling, hydrostatic testing, clean up, and restoration. Where necessary prior to the start of construction, Fox Energy would complete land or easement acquisition and commence staking the pipeline centerline and temporary and permanent ROW. The ROW would then be cleared and graded where necessary to create a level work surface. During grading, topsoil would be separated from subsoil to minimize disturbance to the soil profile.

Following clearing and grading operations, a trench would be dug for the pipeline using a backhoe. Material excavated during trenching operation that is suitable for backfill would be temporarily piled to one side of the ROW, with topsoil and subsoil separated. Material that is not suitable for backfill, or in excess of backfill requirements, would be hauled away to a suitable location. Prior to beginning trenching operations, standard precautions would be taken to identify and avoid any existing underground utility lines that cross the ROW. Proper erosion control practices would be employed to minimize erosion during trenching and construction activities.

Construction across roads, highways and railroads would be in accordance with requirements of applicable permits or approvals. Railroads, highways and paved roads would be crossed by boring underneath the roadbed and installing the pipe within a casing if required by the permitting authority. The bore would be designed to withstand anticipated external loads.

The stringing operation involves moving the pipe sections along the prepared rights-of-way. If necessary, individual sections of pipe would be bent to fit the contours of the trench. The pipe sections would be lined up on supports and welded to form a continuous pipeline along the side of the trench. Completed welds would be visually and radiographically inspected by a qualified inspector and repaired as necessary. All piping would be protected by an external coating that is applied at the mill. A coating would be field-applied to each weld joint. The pipeline coating would be inspected to locate and repair any faults or voids.

Figure 2-7 A typical sequence of events for natural gas pipeline construction



The bottom of the trench would be inspected to ensure that it is free of rocks and debris. If necessary, sand or soil padding would be placed in the bottom of the trench. The pipeline would then be lowered into the trench using side-boom tractors. A final inspection would be done to ensure that the pipeline is properly placed on the bottom of the trench, that all bends conform to the alignment of the trench, and that the pipe coating has not been damaged. The trench would be backfilled, using material originally excavated from the trench, if possible. The fill would be compacted to avoid future settlement. Finally, the ROW would be restored, to the extent possible, to preconstruction conditions. Prior to placing the gas line in service, the line would be hydrostatically tested to check for leaks. A hydrostatic test consists of draining the pipeline, filling it with water, and increasing the pressure within the pipeline to identify weak points.

Auxiliary Facilities -- Emergency Diesel Generator and Boiler

A diesel electric generator would operate in the event of a loss of power and would be used to produce the electricity required to ensure a safe shutdown of the CTs and the plant itself. Diesel fuel would be delivered by truck and stored in a 2,300 gallon tank on site.

An auxiliary boiler would burn natural gas to supply 40,000 pounds per hour of steam for plant shutdowns and startups.

Auxiliary Facilities -- Hazardous Chemical Storage and Management

Chemicals for construction and operation

Fox Energy has categorized the hazardous chemicals that would be used during construction and operation. Table 2-1 summarizes typical chemical usage, quantity and storage methods expected during construction of the plant. Table 2-2 consists of chemicals that will be permanently stored on site during operation of the plant.

Table 2-1 Potentially hazardous chemicals on site during power plant construction

Chemical	Use	Quantity Stored Onsite	Form/Type
Hydrochloric acid (HCl)	Chemical cleaning of HRSG (acid cleaning)	10,000 pounds (used for initial chemical cleaning and may be used for future chemical cleaning).	Liquid, 30 percent HCl
Ammonium bifluoride ($NH4HF_2$)	Chemical cleaning of HRSG (acid cleaning)	200 pounds (used for initial chemical cleaning and may be used for future chemical cleaning).	Crystals, 95 percent
Citric acid	Chemical cleaning of HRSG (acid cleaning)	100 pounds (used for initial chemical cleaning and may be used for future chemical cleaning).	Powder, 99 percent
Hydroxyacetic acid	Chemical cleaning of HRSG feedwater system (acid cleaning)	1,000 pounds (used for initial chemical cleaning).	Crystals, 99 percent
Formic acid	Chemical cleaning of HRSG feedwater system (acid cleaning)	600 pounds (used for initial chemical cleaning).	Liquid, 90 percent
Sodium carbonate (Na_2CO_3)	Chemical cleaning of HRSG (neutralization)	500 pounds (used for initial chemical cleaning and may be used for future chemical cleaning).	Powder, 99 percent
Sodium nitrite ($NaNO_3$)	Chemical cleaning of HRSG (passivation)	500 pounds (used for initial chemical cleaning and may be used for future chemical cleaning).	Crystals, 99 percent

Cleaning chemicals shown are those typically used. Other alternatives may become available in the future.

Table 2-2 Potentially hazardous chemicals on site during power plant operation

Chemical	Use	Quantity Stored Onsite	Form/Type
Aqueous ammonia	Selective catalytic reduction of CT emissions	30,000 gallons in bulk storage tanks (approximately 7 days storage)	Liquid, <20 percent ammonia
Sodium hydroxide (NaOH)	Demineralizer resin regeneration and neutralization	6,000 gallon bulk storage tank (approximately 30 days storage)	Liquid, 50 percent
Sulfuric acid (H_2SO_4)	Demineralizer resin regeneration and neutralization	6,000 gallon bulk storage tank (approximately 30 days storage)	Liquid, 93 percent
Disodium phosphate (Na_2HPO_4)	Boiler water pH and scale control	500 pounds (approximately 30 days storage)	Granular, 98 percent
Trisodium phosphate (Na_3PO_4)	Boiler water pH and scale control	500 pounds (approximately 30 days storage)	Granular, 98 percent
Aqueous ammonia	Feedwater pH control	200 gallon (55 gallon drums) (approximately 30 days storage)	Liquid, 30 percent solution
Hydrazine	Feedwater oxygen scavenger	100 gallon (55 gallon drums) (approximately 30 days storage)	Liquid, 35 percent solution

Chemical	Use	Quantity Stored Onsite	Form/Type
Sodium sulfite ($Na_{2\ SO2}$)	Dechlorination of cooling tower blowdown	2,000 pounds	Powder
Hydrated lime ($Ca\ (OH)_2$	Raw water softening	30,000 pounds	Powder, 93 percent
Soda ash ($Na_{2,}\ CO_2$)	Raw water softening	30,000 pounds	Powder, 99 percent
Laboratory reagents	Various	Small amounts, generally less than 5 pounds	Liquid and granular
Mineral insulating oil	Transformer systems	16,000 gallons	Insulating fluid
Lubrication oil	Rotating equipment	13,000 gallons	Steam and gas turbine bearing lubricating oil for 500°F bearing conditions.
Diesel fuel	Fuel for diesel driven fire pump	2,300 gallons	No. 2 fuel oil
Various detergents	Combustion turbine compressor cleaning	900 pounds (for periodic cleaning)	Liquid or granular

Storage tanks

Tanks to store aqueous ammonia, sodium hydroxide and sulfuric acid would be housed on the power plant site (see Figures 2-2 and 2-3). Fox Energy states that the aqueous ammonia would be stored in two 15,000-gallon tanks. The aqueous ammonia is a reagent for the selective catalytic reduction process used to reduce NO_x emissions from the power plant. There would be 6,000 gallons of sodium hydroxide and 6,000 gallons of sulfuric acid stored on-site. These chemicals would be used in the treatment process to produce demineralized water.

No large oil storage tanks would be located on the site. There would be a 2,000-gallon tank for the diesel electric generator and a 300-gallon tank for a diesel-powered fire pump.

Hazardous chemical management

Fox Energy states that it would store, use and dispose of all chemicals during construction and operation of the plant consistent with applicable federal, state and local requirements. Requirements include the following:

1. Design and utilization of appropriate storage and containment structures.
2. Providing appropriate secondary containment, such as dikes that can hold all spills.
3. Storing materials away from vehicle traffic and operations.
4. Providing emergency response and spill cleanup materials.

5. Providing adequate training in chemical handling and emergency response.
6. Conducting regular inspections of chemical storage areas.
7. Developing appropriate spill prevention control and countermeasure plans.
8. Developing, maintaining and implementing standard procedures for chemical loading, unloading, handling, and disposal.

Where possible, fueling of vehicles would take place off-site at commercial fueling facilities. Where on-site refueling is required, appropriate control measures including providing secondary containment and spill control materials would be implemented.

Appropriate safety related equipment such as eye wash stations, first aid kits, and fire extinguishers would also be provided.

Where applicable, Fox Energy would make agreements with the local emergency planning coordinator (LEPC) to ensure proper coordination of emergency response activities. The LEPC and associated service providers such as the fire department, police department, and any emergency medical services would be familiarized with the facility and invited to tour the facility and participate in any planned emergency exercises.

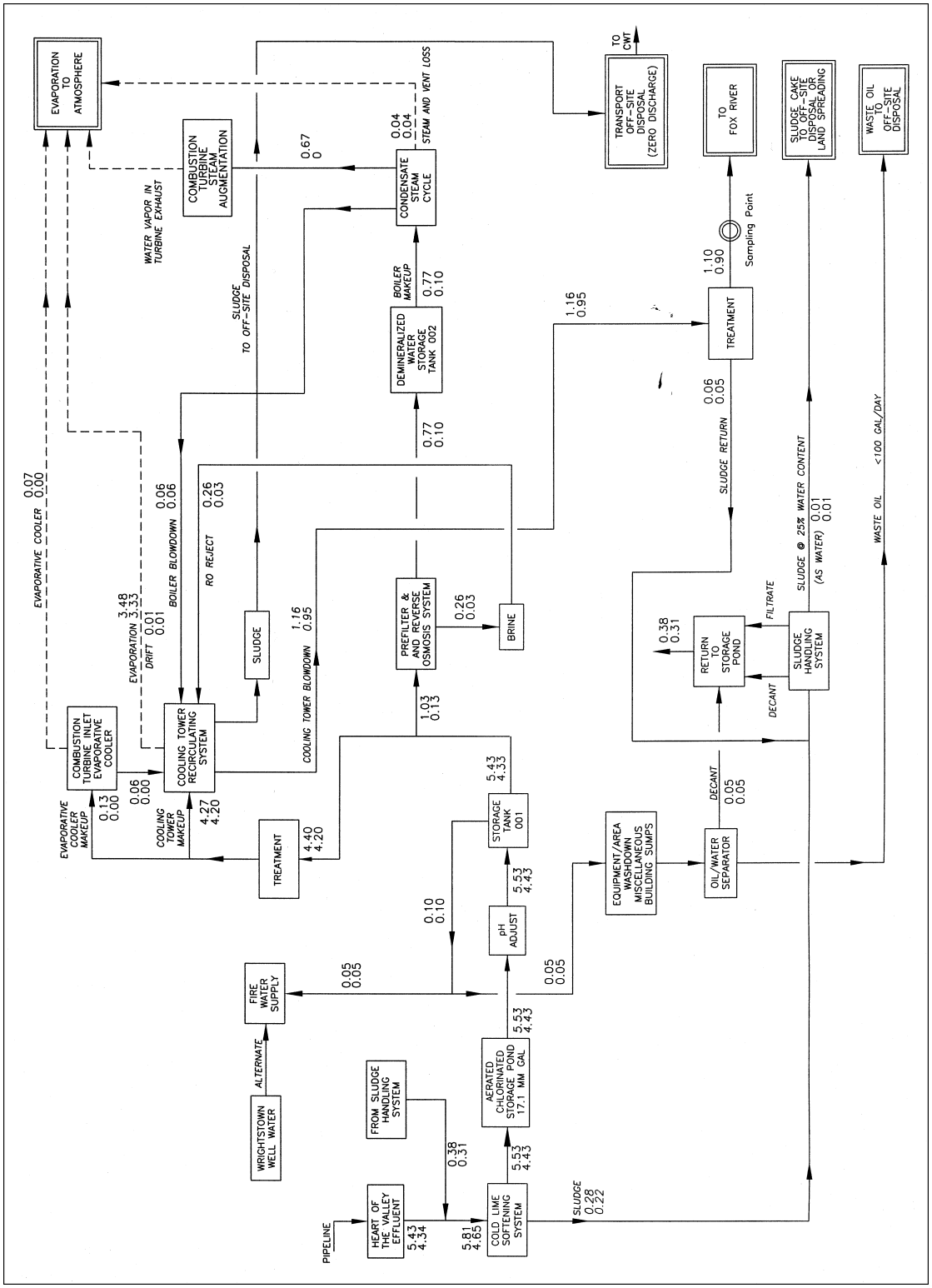
An emergency coordinator for the site would be designated and available, or on-call, at all times. The emergency coordinator and facility personnel would be trained in spill notification requirements, chemical handling procedures, worker right-to-know programs, community right-to-know programs, hazardous waste regulations and requirements, and emergency response regulations. All hazard communication program requirements and programs would be developed and implemented, including providing complete Material Safety Data Sheets (MSDS) and a written Hazard Communication Program.

Auxiliary Facilities -- Water

Water use

A water cycle for the plant is illustrated in Figure 2-8. All of the turbines would share common water facilities. For both sites, approximately a maximum of 4.3 MGD would be evaporated while the facility is operating at ambient summer design (90° F). This water would be used primarily for evaporative cooling and blowdown but also demineralizer makeup, and fire protection. The cooling tower cycle will use over 96 percent of the water, most of which will be evaporated. Potential environmental impacts of the proposed water supply and discharge systems are discussed for each of the proposed power plant sites in Chapters 3 and 4.

Figure 2-8 Diagram of the water mass balance for the proposed combined-cycle plant



Water sources

The HOV treatment plant in Kaukauna would supply process water for the proposed power plant. This would be the first large power plant use of treated or "gray" water in the state. Potable water would be supplied either by an on-site low capacity well or from local municipal water supplies.

Heart of the Valley Municipal Sewerage District (HOV)

HOV presently discharges about 4.3 MGD of treated effluent into the Fox River. Under contract with Fox Energy, most of this effluent discharge would be diverted via buried pipeline to the proposed Fox Energy generation facility. The water supply pipeline would originate at HOV where a duplex lift station would be constructed to chlorinate and transport the wastewater to the proposed facility. Fox Energy would cover the costs for the lift station and pipeline connection to HOV. The lift station would be capable of pumping enough water to the power plant to meet maximum operational needs as well as filling the on-site water storage facility in the case that HOV produces a surplus of water and the reservoir at the power plant is not full.

Treated effluent from the HOV treatment plant would be piped via a buried 24-inch diameter HDPE pipeline to the Freedom Site or a 22-inch diameter HDPE pipeline to the Kaukauna Site. The supply pipeline would be pressurized to 80 pounds per square inch (psi) to the Freedom site or 156 psi for the Kaukauna site. For the most part, the water pipelines would be constructed using open trench construction methods. For stream, wetland, and road crossings, directional drilling or jack and bore methods would be used. For a description of these construction methods see Chapter 3.

Fox Energy water treatment and storage

HOV operates under an existing DNR wastewater discharge permit that limits the concentration and loading of conventional and toxic pollutants to meet water quality standards set for the Fox River. The Fox River has a wasteload allocation for carbonaceous biological oxygen demand and nutrients. Fox Energy's operations may not exceed the allocation set for HOV. Water received from HOV would also be treated by Fox Energy prior to storage at the plant site. On-site water treatment will consist of secondary chlorination and cold lime softening. Cold lime softening is a solids-contact process that utilizes treatment chemicals such as lime and soda ash to reduce suspended solids, hardness, and alkalinity. This process produces a wet, non-hazardous waste material that would be dewatered by a sludge handling system. The filtrate from this process would be returned to the water treatment system, while the dewatered material would be transported off-site for disposal.

Incoming water would be stored in a 17-million gallon water storage facility. All process water utilized at the Fox Energy facility would be drawn from this water storage facility. Details on the water storage facility can be found in this chapter under plant description. The water storage facility would also allow the power plant to operate during short-term disruptions in the supply

of water from the HOV facility or for short periods of time when plant operational requirements outpace the rate at which water is supplied from the HOV facility.

Responses to poor water quality from HOV

The water supply agreement between HOV and Fox Energy requires HOV to supply water treated to meet HOV's WPDES permit limits. There is the potential that the HOV-supplied water might not meet Fox Energy's needs. HOV is required to conduct periodic tests on the treated effluent to be transferred to Fox Energy and must notify Fox of any noncompliance with permit specifications. Fox Energy has the right to reject nonconforming treated effluent. In addition, the proposed Fox Energy facility would have additional treatment facilities at the power plant site sufficient to meet Fox' Energy's own WPDES limits for discharge into the Fox River. Fox Energy's treatment system would include pH adjustment, dechlorination, halogenation using bromine compounds, and solids processing. Prior to use, boiler makeup water would be filtered and treated through reverse osmosis and demineralization.

Water discharge

Discharge water quality - Wisconsin Pollution Discharge Elimination System (WPDES) Permit

Most of the water supplied by HOV would be lost to evaporation from the cooling towers. However, about 21 percent of the process water would be discharged, via a second pipeline, into the Fox River. The Fox facility would discharge between 0.9 and 1.1 MGD to the Fox River. The wastewater discharged to the Fox River from the proposed power plant would consist solely of cooling tower blowdown. Low volume waste streams such as equipment/area wash water, floor drains, and oil/water separator decant would be recycled to supplement the makeup water for the cooling tower. High strength and/or high volume wastewaters (such as boiler tube fireside washing and cleaning chemical wastes) would be transported off-site by a DNR-approved contract hauler. The water balance drawing in Figure 2-8 identifies the larger waste streams.

The quality of the discharge water must be regulated through a DNR WPDES permit. Although Fox Energy has submitted an application, the DNR has not yet issued a WPDES permit. Any Commission order approving this project would be conditioned upon Fox Energy being able to obtain this permit.

In its WPDES permit application Fox has characterized the chemical constituents of the water it would discharge into the Fox River. The WPDES permit would regulate the wastewater discharge from the power plant to ensure the protection of humans, aquatic life, and wildlife. The permit would include monitoring requirements and discharge limits based on Wisconsin water quality standards and the U.S. EPA New Source Performance Standards (NSPS) for the steam electric power generating industrial category.

As a result of evaporation occurring in the cooling tower, there would be a 4- to 5-fold increase in the concentration of chemical constituents of the Fox Energy plant's discharge water compared to the incoming makeup water which is treated effluent from HOV. The projected effluent concentrations were calculated based on maximum and average energy production,

corresponding to concentration factors of 4.89 and 4.77, respectively. While the effluent concentrations for a power plant that does not yet exist cannot be predicted with absolute certitude, the DNR believes the projected effluent concentrations estimated by Fox Energy are plausible.

The following chemical constituents have either water quality-based or NSPS standards. Fox Energy states in its February 21, 2002, permit application that an appropriate wastewater treatment system would be designed. It would consist of settling (aided by chemical precipitation), neutralization, and de-halogenation.

Phosphorus

The WPDES permit would have a categorically-based phosphorus limitation of 1 milligram per liter (mg/L). Because cooling tower water conditioning chemicals contain phosphorus, untreated effluent would exceed the phosphorus discharge limitation. Therefore, Fox Energy proposes to use a settling treatment system for phosphorus removal. Fox Energy anticipates using chemical coagulation to assist in the removal of phosphorus. The DNR's review of plans for numerous industrial wastewater treatment facilities indicate that this process would be capable of meeting an effluent limitation of 1 mg/L.

Oil & grease

Based on the NSPS, the WPDES permit would have daily maximum and monthly average oil and grease limitations of 20 mg/L and 15 mg/L, respectively, and would also have corresponding mass limitations. Fox Energy proposes to use an oil/water separator to meet these limitations. The oil/water separator (OWS) would intercept washdown water and other process streams. It is designed to produce an effluent with 10 mg/L of oil and grease. The OWS decant water would be recycled to the pre-treatment reservoir, while the oil and grease would be pumped out and removed off-site by a contractor for appropriate disposal or recycle.

Chromium

Based on the NSPS, the WPDES permit would have maximum-daily and average-monthly total chromium limitations of 0.2 mg/L. Fox Energy does not plan to use any compounds containing chromium. The analysis of the treated effluent from HOV shows no chromium, so this pollutant is not a concern.

Free available chlorine (FAC)

Based on NSPS, the WPDES permit would have maximum daily and average monthly FAC limitations of 0.5 mg/L and 0.2 mg/L, respectively. Rather than using a chlorinated compound, Fox Energy proposes to use a stabilized hypobromous acid formula as a biocide in the cooling tower. The feed rate of this compound has not been determined, because the actual biological demand of the system is not known. Sodium bisulfite solution would be used to deactivate the bromine. There is no water quality-based or NSPS effluent standard for sodium bisulfite or its components.

Total residual chlorine

If a chlorinated compound were used, the DNR would impose a water-quality based effluent limitation of 69 µg/L (daily maximum). Since Fox Energy would be using a brominated

compound, the WPDES permit would have a limitation of 69 µg/L (daily maximum) total residual halogen, with a corresponding mass limitation. The sodium bisulfite (discussed above) should reduce total residual halogen to below the level of detection.

Priority pollutants

The permit would prohibit the addition of any priority pollutants in water treatment additives.

Polychlorinated biphenyl compounds (PCBs) and mercury

Fox Energy conducted bench scale tests to determine whether PCBs or mercury could be anticipated in its effluent at 4.75 cycles of concentration of the HOV-supplied water.

The tests concluded that there would be no detectable PCBs or mercury discharge from the power plant. Fox Energy states in its permit application that no PCBs would be used or stored on the project site. Nevertheless, to comply with the requirements of ch. NR 290, the WPDES permit would specifically prohibit the discharge of PCBs.

Fox Energy states in its permit application that no mercury would be used or stored on the project site. Nevertheless, consistent with the DNR's current mercury strategy, the WPDES permit would specifically prohibit a net mass increase in the discharge of mercury, and would also require the submittal of a report to document measures taken to assure compliance with that prohibition.

Additives

The Fox Energy project would use a number of biocide additives in its cooling water system. The WPDES permit will specify daily maximum concentration limits in Fox's discharge to protect water quality and freshwater organisms.

$CBOD_5$

"Five-day carbonaceous biochemical oxygen demand" ($CBOD_5$) is a measure of the organic pollution of a wastewater. The segment of the Fox River into which HOV discharges is subject to a waste load allocation for $CBOD_5$. Consequently, the WPDES permit for HOV limits the mass of $CBOD_5$ that it can discharge, as a function of temperature and flow rate of the Fox River, during the months of May through October. Since the Fox River is "fully allocated" (that is, not capable of assimilating any additional $CBOD_5$), the DNR cannot allow the sum of HOV's and Fox Energy's waste loads to exceed the allowable waste load indicated in the table values of ch. NR 212, Wis. Admin. Code. Fox Energy's WPDES permit would be written to limit the discharge of $CBOD_5$ to acceptable levels. The only potentially significant source of $CBOD_5$ from the operation of the proposed power plant would be biological growth on the cooling tower heat transfer media. To ensure effective heat transfer across the tower media, Fox Energy has proposed using cooling tower water treatment additives, as previously discussed. These additives would minimize the growth of fouling organisms to the extent that waste load allocation exceedances attributed to the operation of the power plant would be extremely unlikely.

Chloride

Chloride in the effluent supplied by HOV to the power plant would be concentrated in the cooling tower, resulting in an effluent concentration of 2,206 mg/L. Wisconsin has aquatic toxicity criteria for chloride. Based on the acute criterion and the proposed design and operation of the effluent discharge structure, discussed below, the calculated effluent limitation is 2,700 mg/L.

PH

Wisconsin's water quality standard for pH is 6-9. Fox Energy proposes to provide pH adjustment, as needed, in the precipitation/settling treatment proposed for phosphorus reduction.

Temperature

Fox Energy proposes to meet the temperature standards that Wisconsin would promulgate in the future. Because the amount of dilution at the discharge point would be so great, a permit limitation of 120ºF daily maximum would adequately protect water quality. Fox Energy has submitted computer aided modeling of the discharge plume, which predicts that the temperature outside of the zone of initial dilution would not exceed 3ºF above background temperatures.

Whole effluent toxicity (WET)

In addition to the chemical-specific monitoring and limitations, the WPDES permit would require whole effluent toxicity testing to ensure protection of aquatic life.

Water quality monitoring

The WPDES permit establishes detailed reporting and monitoring requirements for Fox Energy's water discharge. Monitoring protocols require daily, monthly, or annual monitoring depending on the parameter or pollutant in question. For example, for this project, pH must be monitored daily on a continuous basis while copper and chromium are monitored on a monthly basis. All sampling and laboratory testing procedures must be performed according to established DNR-approved methods. Monitoring results are reported to the DNR on a monthly basis.

Water pipeline and other structures

Discharge structure in Fox River

The discharge location in the Fox River for both proposed power plant sites would be the same (see Figures 3-3 and 4-2). The discharge structure would be located about 1,500 feet south of the proposed Kaukauna site along an existing high-voltage electric transmission line ROW. The discharge end of the pipeline would be six inches in diameter and buried in the river bed with only the last few feet exposed in the water (see Figure 3-4). To install it, a boring rig would be placed about 300 feet back from the top of the bank to the left, in an agricultural field. Other heavy equipment would be on the opposite bank to assist in pipeline installation.

The pipe opening would protrude about one foot above the river bottom and approximately 125 feet from the left bank, on the north side of river, at the normal pool depth and about 96 feet

from the left bank at the low pool depth. The pipe opening would be about 9.5 feet below the water's surface. A 1.5-inch copper or brass mesh, biocidal screen would be placed over the pipe outlet to restrict adult fish entry into the pipe during no-flow periods. The combination of high effluent flow velocity and the screen would prevent zebra mussel colonization in the pipe and on the screen. A 20- by 20-foot stone riprap pad would be placed around the base of the outlet to minimize scour. The pad would consist of 12 inches of angular riprap over six inches of gravel. The total volume of rock placed on the river substrate would be about 23 cubic yards.

In order to install the riprap pad, the river substrate would need to be dredged to a depth of about one foot in the area of the pad. Approximately 15 cubic yards of river sediment would be excavated. Contractors would use a backhoe on a barge to remove dredge material. Prior to dredging, a silt curtain would be installed in the water column to minimize downstream movements of suspended sediments. Excavated material would be brought to the surface and placed in a roll-off box on the barge. This dredge material would then be transferred to the plant construction site, where it would be dewatered. Both the water and drained sediment would be tested for the presence of hazardous substances to ensure proper disposal.

If possible, Fox Energy would build the discharge structure during low-flow periods, typically in late summer. It is estimated that installation of the structure would take between one and two weeks.

Fox Energy has applied for and received ACOE Section 404 permit approval for the discharge structure.

Water pipeline construction

Pipeline design

Both supply and discharge water pipelines would consist of HDPE pipe that is manufactured for sanitary wastewater transport under pressure.

Depending on the power plant site selected, the supply pipe would be either 22 or 24 inches in diameter and the discharge pipe would be either 6 or 12 inches in diameter. Treated effluent from the HOV treatment plant would be piped via a buried 24-inch diameter HDPE pipeline for the Freedom Site or a 22-inch diameter HDPE pipeline for the Kaukauna Site. This supply pipeline would be pressurized to 80 pounds per square inch (psi) to the Freedom site or 156 psi for the Kaukauna site. The discharge pipeline for the Kaukauna Site would consist of a six-inch diameter HDPE buried pipe pressurized to 20 psi. For the Freedom site, a 10- to 12-inch diameter HDPE pipe pressurized 30 to 40 psi would be used. All pipe joints and connections would be fused and pressure tested. The pipeline would also be designed with valves and venting systems placed in appropriate locations along the pipeline to allow pipeline sections to be inspected or isolated and drained for repair.

For most of its length, the pipeline would be buried using an open trench method. Directional or jack and bore boring techniques would be used for road, stream, and wetland crossings.

General location of pipelines and easement requirements

The water supply and wastewater discharge pipeline routes for both the Freedom and Kaukauna sites have been located, for the most part, along county, state, and city roads (see Chapters 3 and 4 for a description of the routes under consideration). Fox Energy proposes to place the water pipelines inside road ROW. A permanent 35-foot wide maintenance easement would be required, measured from the center of the pipeline and away from the road. A temporary 15-foot construction easement would also be needed to facilitate construction. Figure 2-9 shows the relationship between road, pipeline, and easements. Commission approval for this project would not confer to Fox Energy the right of eminent domain. This means that Fox Energy may not condemn private property for placement of facilities or for construction easements.

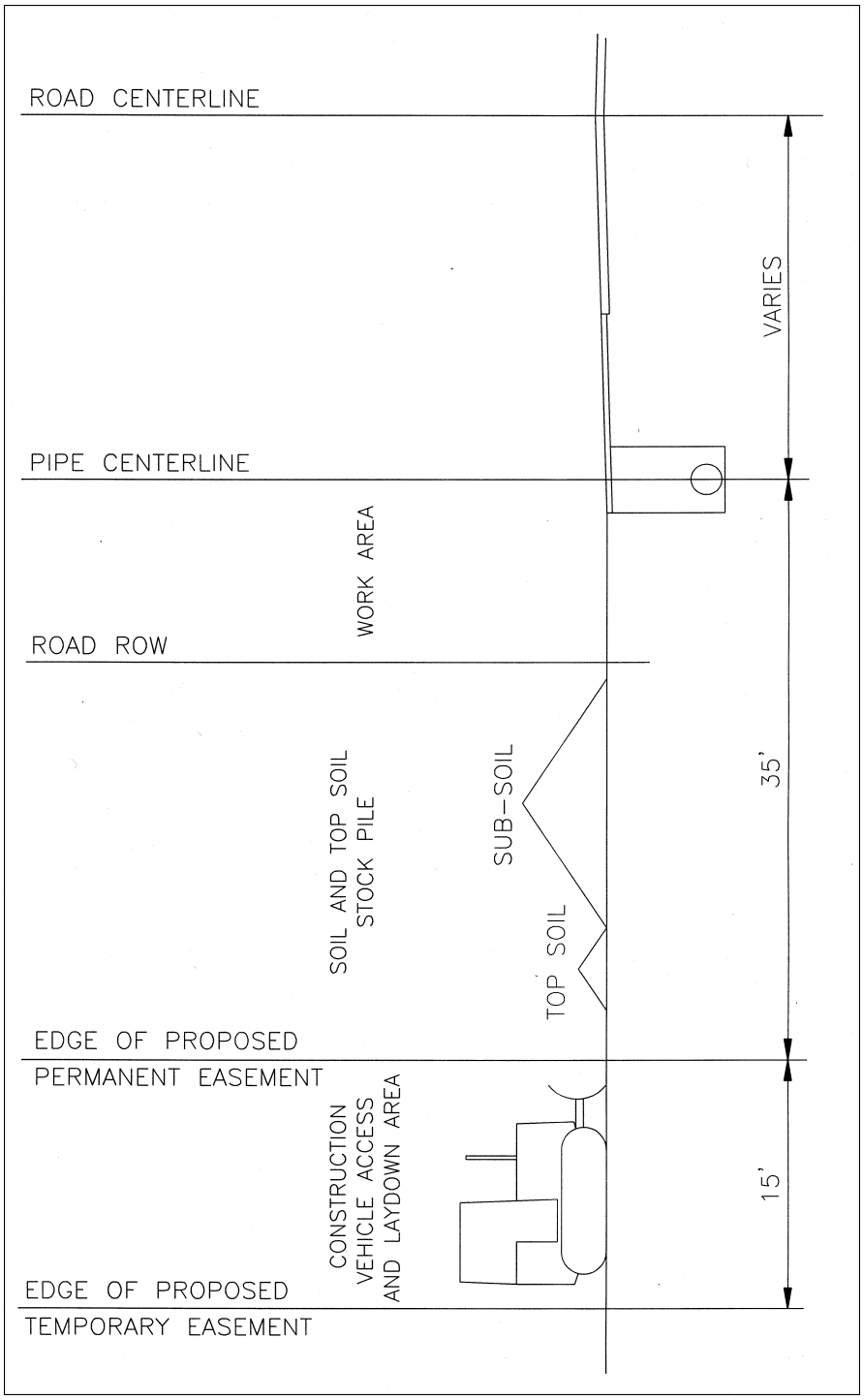
Depending on the type of road, placement of the pipeline within the road ROW would require permit approval from city, county or state and federal highway authorities. A permit for construction inside road ROW within the city of Kaukauna has been issued. However, because the Fox Energy project is a merchant plant and not a public utility, placement of the pipelines inside state highway ROW would require permits from both the Wisconsin Department of Transportation (DOT) and the Federal Highway Administration. As a merchant plant, Fox Energy is, by state DOT policy, prohibited from placing facilities inside the public ROW of state highways. This prohibition can be waived if state and federal highway authorities determine that the use of the public ROW is in the public interest and will not impair the highway or interfere with the free and safe flow of traffic. Without state and federal highway authority approvals, the pipeline would need to be located just outside state highway ROW on private land. Even if the pipelines were to be allowed inside the road ROWs, the temporary construction easement and most of the permanent easement would be located on private land. Total easements (temporary and permanent) on private land could vary between 35 and 50 feet wide.

Fox Energy must negotiate water pipeline easements with each landowner. Fox Energy's CPCN application states: "Fox Energy is committed to paying landowners cash for easement acquisition as well as to providing aesthetic improvement to their property in the form of re-vegetation, re-sod, or other simple improvement of the existing land condition upon the completion of the pipeline construction." Easements generally place some restrictions on a landowner's use of easement land. For example construction of buildings or planting trees in the easement may be prohibited.

Preconstruction activities

The following activities would be completed prior to the trench excavation and pipe installation. The pipe and construction materials would be stockpiled in laydown areas located at each end of the pipeline. Surveyors would set stakes denoting the route location. The contractor would then contact the Digger's Hotline to request that the existing utilities be located along the entire length of the pipeline route. As necessary, clearing and grubbing would be conducted along the pipeline corridor to provide a clear and level area to facilitate pipe-laying activities. Small bulldozers are typically used for clearing and grubbing operations.

Figure 2-9 Water pipeline construction diagram



Open trench construction

Topsoil would be removed from the trenching location and stockpiled adjacent to the pipeline or into dump trucks, depending on easement restrictions. Shortly before starting trench excavation, the contractor would lay the pipe sections on the ground adjacent to the pipeline location. Standard precautions would be taken to identify and avoid any existing underground utility lines that cross the new pipeline. This typically involves pre-digging crossing locations with small equipment, and adjusting the pipeline route as required. Erosion control practices, such as silt fences and hay bales, would be employed to minimize erosion during trenching and construction activities.

The pipe trench would be cut with a backhoe such as a Caterpillar 365B L Excavator. Trenches would be a minimum of seven feet deep. Depending on the site and routes, portions of the supply and discharge pipelines might be laid side-by-side in the same ROW. Trenches would be 34 inches wide for single pipe trenches and 58 inches wide for double pipe trenches. Cross-sections of single and double pipe construction are shown in Figure 2-10.

After the trench was cut, the contractor would place sand bedding material on the bottom of the trench. The pipes would be joined on the ground adjacent to the trench, and then would be lowered into the trench. Pipes would be pressure tested to ensure joints do not leak and then the pipe would be completely surrounded with sand bedding material. Then, the trench would be backfilled with soil that was excavated from the trench. Top soil and grass seed, or agreed upon aesthetic treatments, would be placed in all disturbed areas.

Depending on the power plant site and construction routes chosen, it is possible that both the discharge and supply pipelines would be placed within the same ROW. In that case the separate pipelines will be placed side by side in the same trench or bore hole (see Figure 2-10).

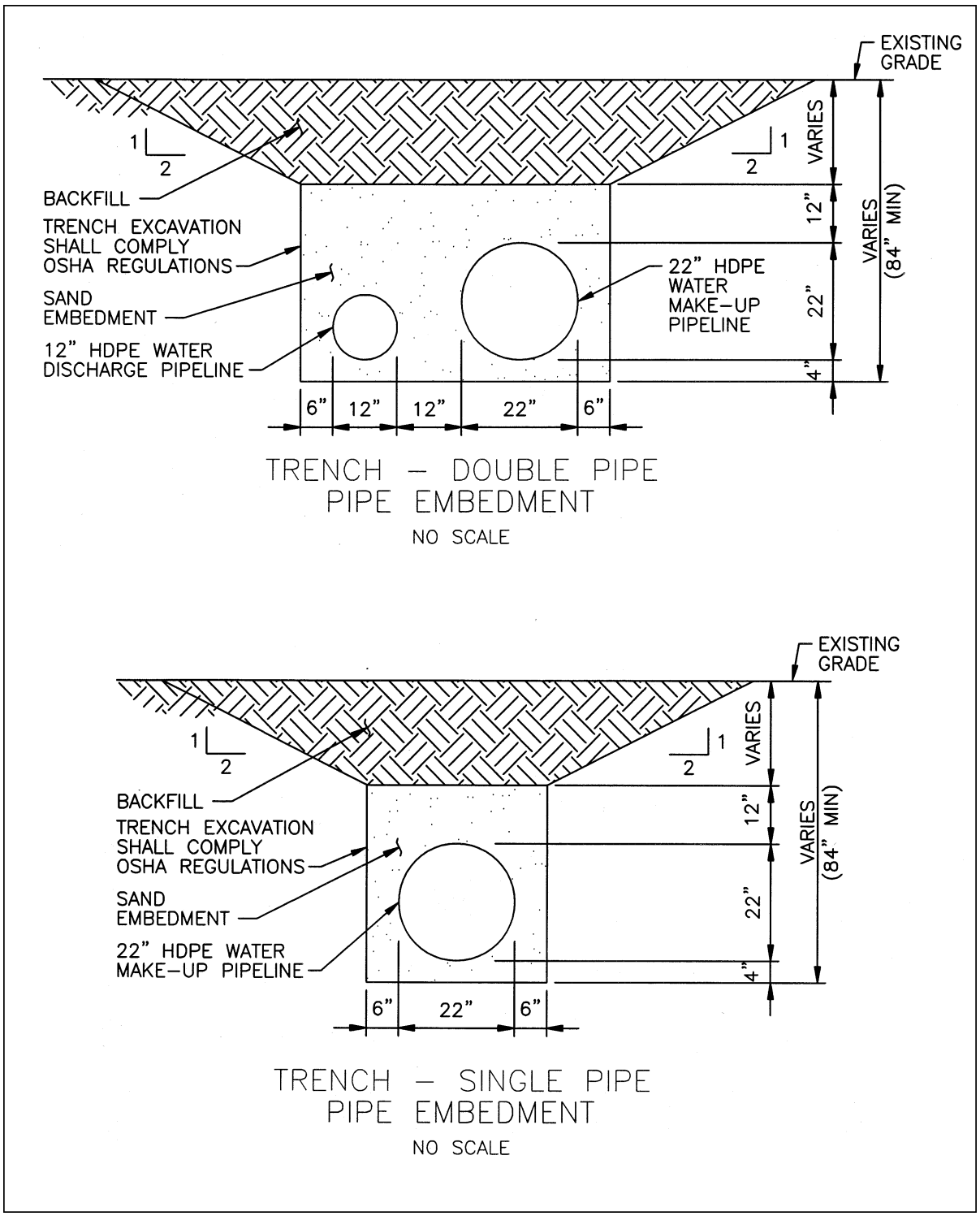
Boring methods

For stream or wetland crossings and for crossing roads and railroads, trenching methods are inappropriate. In these locations, boring methods would be used. There are two types of boring technology proposed for this project. They are directional boring and the jack and bore method.

Directional boring

Directional boring involves drilling a pilot hole using a magnetic steering tool. After the pilot hole is drilled it is progressively enlarged until an adequate diameter is achieved to receive the pipe. During construction, a bentonite (an inert clay material) slurry is continuously forced through the bore-hole to lubricate the rotating drill head and to help maintain the shape of the bore hole. It is possible that, when the bore activity is passing beneath a stream bed or wetland, cracks or fissures in the soil or bedrock could allow some of the bentonite to escape. This could lead to some short-term adverse impact to water quality and could impact aquatic species, such as mussels, that reside near or downstream of the bentonite leak.

Figure 2-10 Cross-sections of water pipeline trench options



Typically directional boring operations require excavation of an access pit on both sides of the area being bored. The entrance side in this project would require a width of 50 to 100 feet and a length of 150 to 250 feet (see Figure 2-11). This area would be utilized for the drilling equipment, temporary bulk bentonite storage tanks and water tanks. The pipe that would be directionally bored would be "strung" and welded together behind the directional boring rig within the limits of the right of way. The exit side pit would generally be about 50 feet wide and 50 to 100 feet in length. The rig side and exit side pits would typically be between 3 to 8 feet in depth, depending on the equipment used. All boring construction areas require a soil erosion control plan similar to those developed for trench construction areas. Top soil would be reserved and returned to the pit area after construction is complete.

The depth of the bore hole is generally regulated by a state or local agency. In this case, the DNR must be consulted for all stream and river crossings. One potential concern when boring under a river or lake is the possibility that the water associated with the water body might be drained. Another concern would be that bentonite lubricant leaking out of the bedrock through fractures and fissures could affect water quality. To guard against adverse impact, Fox Energy might be required to work closely with the DNR and perform a soil study before beginning construction. Regardless, Fox Energy should have a contingency plan to detect and respond to "frac outs," and must notify the DNR of any such events as soon as possible. Depth of the bore hole could vary, but a minimum of 20 feet is likely. For road crossings, the company would need to consult with city or state highway authorities.

Jack and bore method

With the jack and bore method, no bentonite lubricant is used. A carrier pipe with cutter head is "jacked" through the earth and an auger removes soil as the pipe moves forward. The carrier pipe is sized to allow the water pipe to be inserted concentrically in the carrier (see Figure 2-12). A heat shrinkable casing seal is also installed at the ends of the carrier pipe.

Typically jack and bore operations also require the excavation of two pits, an exit pit and an entrance pit. The entrance pit must be large enough to handle all of the boring equipment and fabrication of the pipe. Accordingly, the size of the entrance pit can vary depending on the length of the boring equipment and pipe lengths to be installed. Typical pipe lengths vary from 10-foot to 40-foot lengths. In order to minimize environmental impacts, smaller lengths would be used. However this would take longer to install. The entrance pit would have a width of 15 feet and a length varying from 20 feet to 50 feet.

The exit pit is generally relatively small compared to the entrance pit, ranging from 100 square feet (10-foot by 10-foot) to 225 square feet (15-foot by 15-foot). Depths of entrance and exit pits would vary, depending on cover requirements, but are typically between 3 to 5 feet (see Figure 2-12).

Yard runoff at the plant site

A permanent storm water basin would be constructed to allow collected sediment to settle out prior to discharge and to ensure that current peak runoff rates are not increased. See Figures 2-2

and 2-3. It is expected that the collected storm water would ultimately be discharged to a tributary of the Fox River in accordance with DNR permitting.

Figure 2-11 Access pits for directional boring

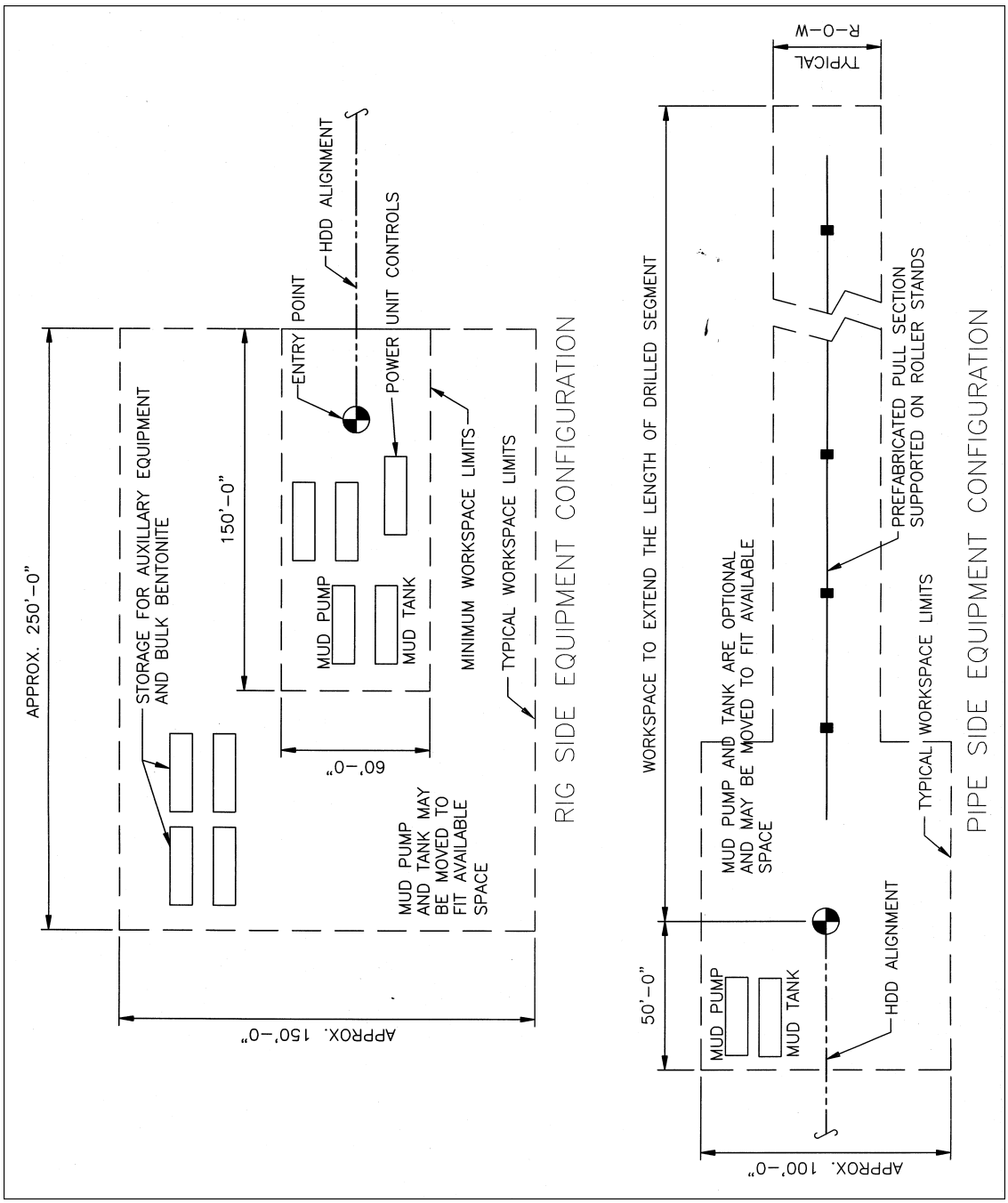
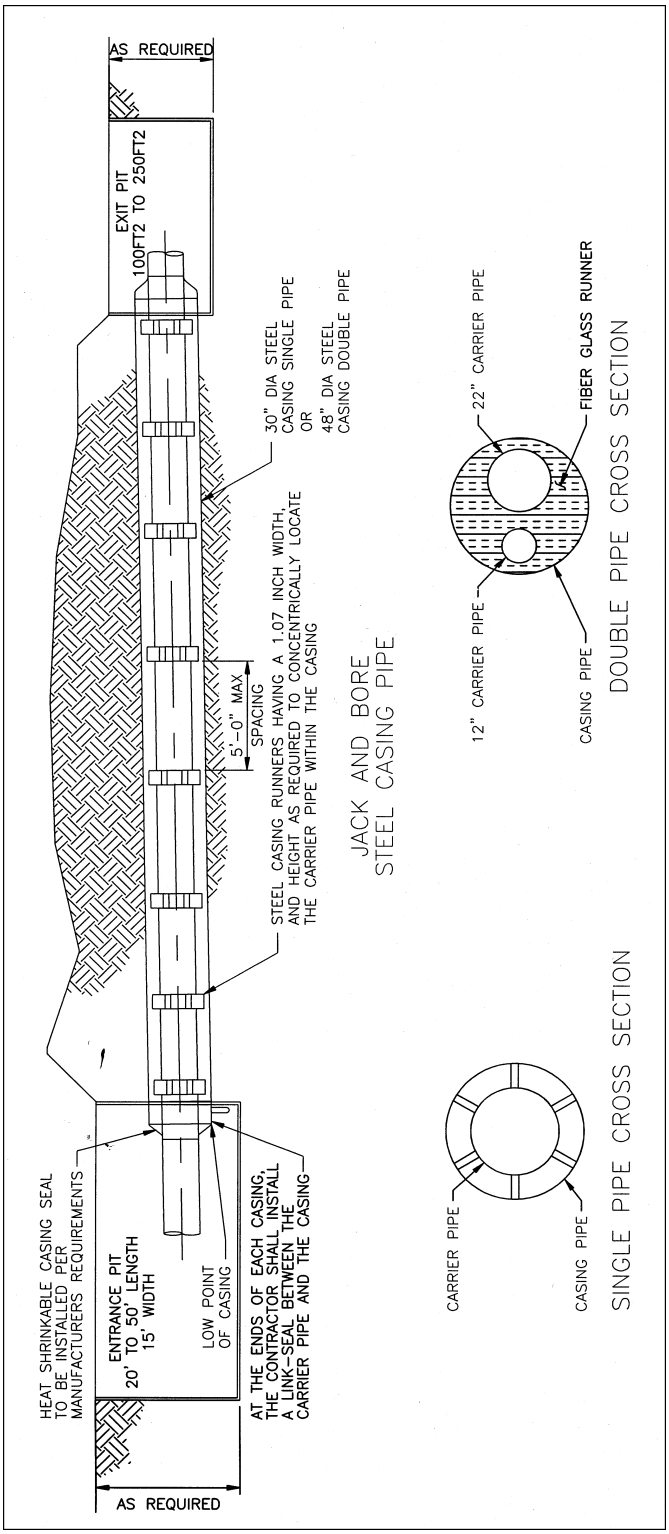


Figure 2-12 Jack and bore construction detail



Auxiliary Facilities -- Solid Waste Generation and Recycling

Some solid waste would be generated during plant operation, including wastes from offices and other facilities. Normal maintenance would also be expected to generate small quantities of solid waste periodically. When disposal of wastes is necessary, contractors would be hired. Wastes from offices and other facilities should be recycled wherever possible.

As discussed above, Fox Energy's cold lime softening of the water from the HOV would create a non-hazardous dewatered sludge that would be trucked off site for disposal.

Auxiliary Facilities -- Electric Transmission

Existing electric transmission system

The proposed plant would need to be connected to the existing electric transmission system in order to deliver electricity to users. Both proposed sites are crossed by the existing Point Beach-North Appleton 345 kV transmission line. The existing lines in the area are included in Figures 3-1 and 4-1, in Chapters 3 and 4.

Proposed transmission connection

Preliminary studies indicate that simply connecting the proposed plant to this existing line could have an adverse effect on the stability of the power system. Accordingly, Fox Energy has proposed interconnection approaches that would involve some construction of new 345 kV transmission lines.

While Fox Energy has proposed the new transmission line, the line would be built, owned, and operated by ATC, the transmission-only public utility serving eastern Wisconsin. As a public utility, ATC may employ eminent domain to obtain ROW easements if necessary. ATC has adopted the transmission designs and routes that are described in the Fox Energy application and materials. If the plant is approved, the Commission will determine the route, line design, and construction practices for the new transmission line.

A description of the proposed transmission interconnections, including line design and route alternatives, is presented in Chapter 5.

Construction and maintenance procedures

The first step in transmission line construction is generally clearing the ROW. Trees would be removed so as to provide adequate clearance for the new line. In addition, tree and brush removal and rough grading would be carried out as required to allow access to construction vehicles. Erosion control measures would be employed in areas of soil disturbance.

Tangent structures (those structures used along straight sections of transmission line) would generally be directly embedded. That is, they would be inserted into holes augered into the soil, without concrete. Reinforced concrete foundations would generally be required for special structures like heavy-angle structures or structures at either end of a very long span such as a river crossing.

Once structure installation is complete, insulators would be installed on the structures. Pulley blocks and feed ropes would also be installed, so as to facilitate installation of the wires. Using these feed ropes, specialized truck-mounted equipment would pull all wires into place and establish the correct tension. The wires would then be secured to mounting hardware and the pulleys removed.

Vehicle access for construction would generally be along the ROW from road crossings. Construction in wetlands would be carried out, to the extent practicable, during frozen-soil conditions to minimize impacts. Substantial support mats constructed of wood or plastic may also be used in wet areas to allow vehicle access while protecting the soil and vegetation. Winter construction would also be used to the extent practicable in farm fields, so as to minimize soil compaction. If construction occurred during the growing season and interfered with raising crops, the farmer would be compensated for lost crops.

Upon completion of construction, ground contours would be restored and disturbed areas would be reseeded. Compacted farm fields would be chisel-plowed to improve soil structure. Construction workers would be required to take steps to guard against introduction of invasive species. In addition, the Commission generally requires the construction permit holder to monitor wetlands post-construction for signs of purple loosestrife *(Lythrum salicaria)*, and to take appropriate action if an infestation is discovered.

Tree-clearing operations would be required periodically in areas with tree growth in the ROW, perhaps every five to ten years. ATC would, in general, practice selective cutting of tall-growing tree species, leaving low-growing trees and shrubs in place. Herbicide application could also be used for ROW maintenance, but only where approved by the landowner. Typically, this would involve direct application of herbicide solution to cut stumps of tall-growing trees.

Commission Energy Priority Requirements

Wis. Stat. §§ 1.12 and 196.025 require the Commission to give priority to specific methods of meeting energy demands, to the extent these methods are "cost-effective and technically feasible." The Commission must consider options based on the following priorities, in the order listed, for all energy-related decisions:

1. Energy conservation and efficiency.
2. Noncombustible renewable energy resources.
3. Combustible renewable energy resources.
4. Nonrenewable combustible energy resources, again in the order listed.

a. Natural gas.

b. Oil or coal with a sulfur content of less than 1 percent.

c. All other carbon-based fuels.

If the Commission identifies an option to the proposed power plant during its review that is cost-effective and technically feasible, it could reject the Fox Energy project as proposed. It could not, however, order Fox Energy to build something else in its place.

Energy conservation and efficiency

Demand-side management

Energy efficiency in an area can often be gained without new electric energy production. Energy conservation is one method of "demand-side management" (DSM) as opposed to "supply-side management." DSM techniques include energy conservation, fuel switching, and load management. Each is defined briefly below.

Energy conservation reduces the use of electric energy. Examples of energy conservation include: installing more efficient appliances, improving building insulation, redesigning industrial processes to use less energy, and reducing lighting loads through use of daylighting.

Fuel switching replaces the use of electricity with the use of another energy source. Natural gas has been the frequently selected fuel of choice in the past. However, in the more recent past, with the price of natural gas elevated, other fuels may be considered more often. Examples of fuel switching have recently included replacing electric appliances such as water heaters and clothes dryers with natural gas and using propane for heating fuel instead of electric heat.

Load management reduces the peak demand for electricity during a specific period. Examples of load management include programs that control air condition loads during times of extreme demands for electric power and programs that provide monetary incentives for large users of electricity to shed loads during peak periods.

DSM as an alternative to building a power plant

New power plants are built to generate more electricity, and to provide added capacity to generate when demand for electricity is at its greatest. DSM can often reduce or delay the need to build power plants by lowering the use of, or demand for, electricity. Decreasing demand can have the same effect as increasing supply.

Advantages of DSM over power plants

Using DSM to meet system electric needs can have many advantages over using supply resources such as power plants and power lines. These advantages can be both economic and environmental.

The most significant economic advantage is that, if cost-effective, DSM will reduce customer's electric bills. This can help make Wisconsin businesses more competitive. By reducing the amount of dollars spent on energy in Wisconsin, DSM can also improve the state's economy in general. This is because most of every dollar spent on coal, natural gas, or uranium leaves Wisconsin and our economy.

From an environmental perspective, DSM is the best option for meeting energy needs. Conservation and some forms of fuel switching reduce air pollution, water use, coal and uranium mining, disposal of radioactive waste, production of greenhouse gases, and the depletion of non-renewable resources. Conservation, fuel switching and load management, by reducing the need for power plants and power lines, also reduce the negative impacts of those facilities such as the use of valuable land, destruction of natural habitats, and aesthetic impacts. Almost all of the environmental impacts of the proposed power plant, noted elsewhere in this final EIS, could be avoided if DSM could substitute for the power plant.

There are some potential negative impacts associated with DSM measures. Switching fuels will still have impacts due to the use of the alternate fuel. Load management, if not designed properly, can lead to discomfort or the inefficient disruption of industrial production. High-efficiency fluorescent light bulbs have disposal problems. Overall, though, the negative effects of DSM measures are negligible compared to the building and operation of power plants.

The Commission's legal requirements and limitations regarding DSM as an alternative

DSM, if available, could be an alternative to a power plant. However, Wis. Stat. § 196.491(3)(d) states that the Commission cannot consider alternative sources of supply when deciding whether or not a proposed merchant power plant is "in the public interest."

Fox Energy is not required by law to provide any data on how much of the proposed capacity or energy produced by the plant would be used to meet Wisconsin energy needs, nor is it required to provide data on the cost of generating electricity at the proposed power plant. With no costs to compare to the cost of equivalent DSM, and no data on when or to whom the plant would supply energy, the Commission cannot determine DSM's cost effectiveness as an alternative as required under Wis. Stat. §§ 1.12 and 196.025, or even how much DSM would be equivalent to the proposed plant.

Renewable resources

The proposed power plant would use natural gas as the fuel to generate electricity. Renewable resources that can be used as alternative to natural gas in Wisconsin include solar power, wind power, hydroelectric power and biomass fuels.

Renewable resources as an alternative to a power plant fueled by natural gas

From an economic perspective, money paid for local renewable resources to produce electricity for the state could remain in the state, instead of being paid to out-of-state entities for natural

gas or other fossil fuels. This would be especially true for biomass-fueled generation if fuel crops were grown on Wisconsin farmland.

There are generally fewer or lesser environmental impacts with generation from renewable resources than with generation from fossil fuels. Most of the environmental advantages of renewable resources are related to air emissions. None of the renewable resources noted above produce significant air emissions, if any, except for the burning of biomass fuel. However, if new biomass crops were continually re-grown to supply fuel, the net contribution to global greenhouse gases would be negligible since the new crops would absorb carbon dioxide. Of the various renewable resource technologies, only biomass power would have water use impacts similar to a fossil fueled power plant. Each of the renewable resources would have their own impacts on land use. Some renewable technologies also have particular kinds of negative impacts. For instance, wind power in certain locations has been criticized for its potential to cause bird injuries and deaths due to collisions with the towers and turbines.

Commission's legal requirements regarding renewable resources as an alternative to a natural gas fueled power plant

Like DSM, renewable resources could be an alternative to the power plant and have a higher priority under Wis. Stat. § 1.12 than natural gas combustion. However, under Wis. Stat. § 196.491(3)(d)3, the Commission cannot consider them as an alternative to the proposed technology for the Fox Energy plant because it is a merchant plant.

Market Power

Wisconsin Stat. § 196.491(3)(d)7 requires the Commission, before issuing a CPCN, to find that the proposed wholesale merchant power plant facility "will not have a material adverse impact on competition in the relevant wholesale electric service market."

Presently, due to transmission system constraints and congestion, the relevant wholesale electric service market, from an anti-trust perspective, is the geographic region of the Wisconsin Upper Michigan System (WUMS). This fact was recently documented for the Commission in an independent market power study conducted by Tabors, Caramanis and Associates of Cambridge, Massachusetts.[7] The WUMS market is highly concentrated.[8] When a market becomes so limited, utilities or other players with a large market share or concentration can obtain leverage over the prices being paid in that market. In essence, a large electric generating firm in a narrow competitive energy market can influence prices to its advantage and everyone else's detriment. In economics, such leverage is referred to as horizontal market power and is policed by federal and state anti-trust law.

---

[7] See, Horizontal Market Power in Wisconsin Electricity Markets, A Report to the Public Service Commission of Wisconsin, November, 14, 2000.

[8] Ibid.

However, this is not the case here because Fox Energy LLC is a new entrant to the WUMS market, not an incumbent firm planning a merger or additional capacity. In economic theory, new entrants can discipline the potential for the exercise of horizontal market power. Under the federal anti-trust guidelines, the ease of entry is a specific mechanism that can make even a highly concentrated market conform to the normal price behavior found in typical competitive markets.[9] In summary, even though WUMS is a highly concentrated wholesale electric service market, the fact that Fox Energy LLC is a new entrant means that the Fox Energy LLC facility is unlikely to adversely impact competition in WUMS.

No Action Alternative

Taking no action on this application, by denying the application, would result in no change in the number of power plants in the state. Electricity providers would have the same sources of electricity available as they have currently.

Taking no action on this application, by not making a final Commission decision, would result in automatically granting a CPCN to the applicants under Wis. Stat. § 196.491 (3)(g). The applicant would then have the option of constructing the plant at either of the two proposed sites. The necessary transmission interconnection could also be built as determined by ATC because an automatic CPCN would also be granted to ATC.

[9] See Section 3.0, Entry Analysis, 1992 Horizontal Merger Guidelines, U.S. Department of Justice and Federal Trade Commission, as revised April 8, 1997.

3

Chapter 3 – Environmental Review—Freedom Site

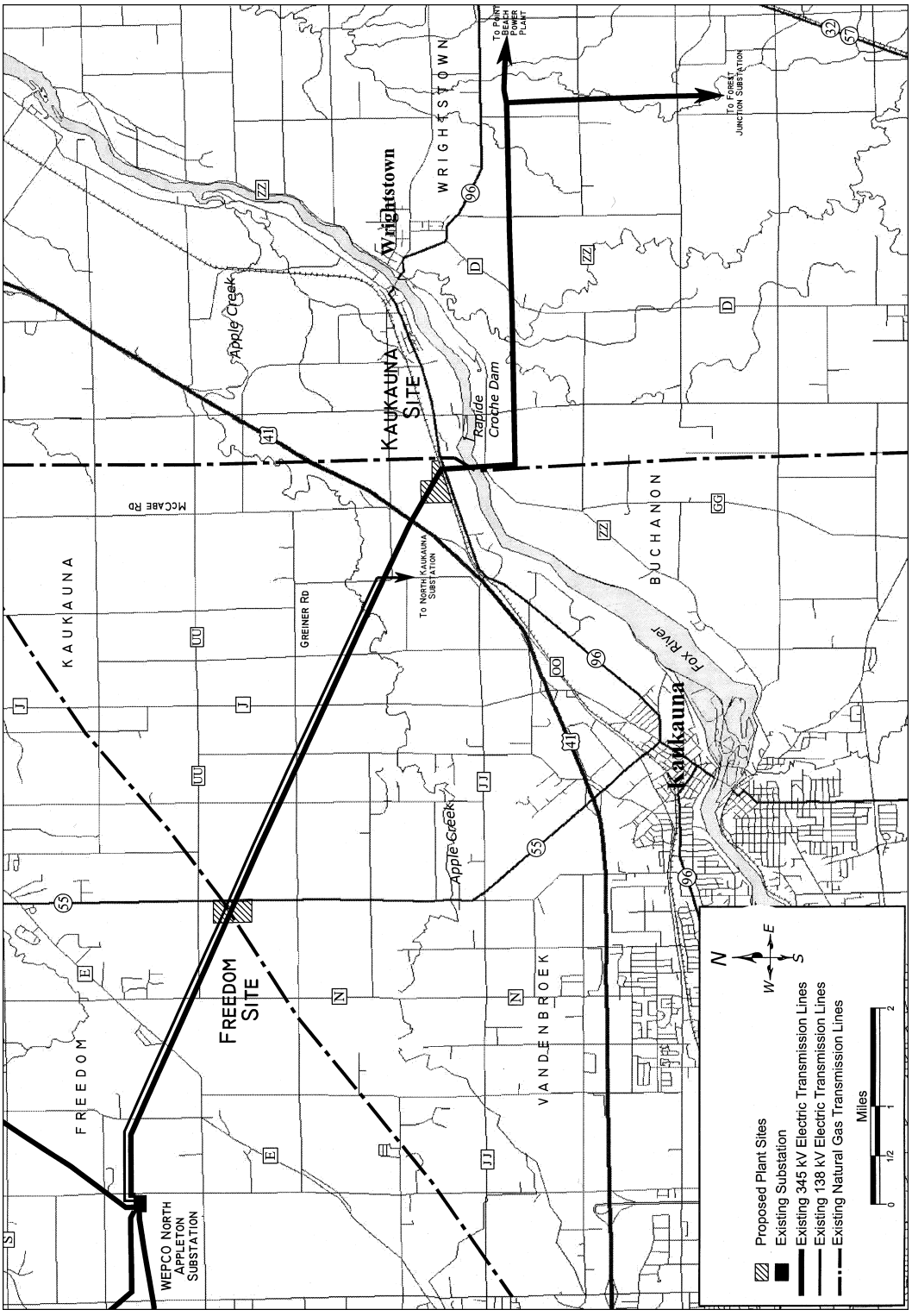
Site Description

The Freedom site is located in the town of Freedom in Outagamie County, in the northeast quarter of Section 27, Township 22 North, Range 19 East. The site consists of a northern and a southern parcel, both classified as agriculturally zoned land. The northern parcel consists of approximately 48 acres, owned by James W. Van Camp and Janice I. Van Camp. Edward J. Coenen owns the 20 acres of the southern parcel. Land use surrounding the project site is agricultural. Approximately 55 acres would be used for the project.

The unincorporated community of Freedom lies approximately 1.5 miles north of the proposed site while the city of Little Chute is located about four miles to the south. A portion of the STH 55, about 500 feet south of the intersection with CTH UU, forms the eastern boundary of the proposed site. The community surrounding the site is an area that contains farms and associated farmsteads, as well as residences not associated with farming. The town of Freedom has a population of approximately 5,262.

In the year 2000, most of the land covering the proposed site was planted in soybeans (35 acres) and corn (19 acres). Drainage ditches occupy the remaining one acre. The site is already traversed by electric transmission and underground natural gas pipelines (see Figure 3-1).

Figure 3-1 **Locations of Freedom and Kaukauna power plant sites and existing electric and natural gas transmission facilities**



Natural Resources

Air

Source description

Fox Energy has submitted an air pollution control permit application to construct and operate the proposed combined-cycle generating station at this site, producing a total of about 530 MW plus approximately 105 MW of additional peaking capacity obtained through gas duct firing. Power production is expected to occur throughout the year, as intermediate load. The power plant is expected to burn natural gas. Fox Energy is proposing to build 185-foot exhaust stacks for the main generators.

Emissions from the proposed project would be generated by the following individual sources:

- Two CT generators and two heat recovery steam generators (HRSGs) firing natural gas (including duct burners).
- One diesel-fired emergency shutdown generator.
- One diesel fired emergency fire pump.
- One auxiliary boiler.

Applicable air quality standards

National Ambient Air Quality Standards

The Clean Air Act requires the EPA to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that could have an impact on human health or welfare. NAAQS have been established for the following pollutants, collectively referred to as "criteria pollutants:"

- Sulfur dioxide (SO_2)
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Particulate matter less than 10 microns in diameter (PM_{10})
- Ozone
- Lead

The EPA has delegated the permitting and review authority to the DNR for all projects affecting air quality. The state of Wisconsin regulates air pollutant emissions under Wis. Admin. Code Chapters 400-499 and has adopted the EPA primary and secondary standards. EPA describes

an area as "nonattainment" if the ambient air quality standard for one or more criteria air pollutants is not met. The Freedom site area is in attainment of the primary and secondary NAAQS for all criteria pollutants.

Best Available Control Technology evaluation

The 1977 Clean Air Act (CAA) established revised conditions for the approval of pre-construction permit applications under the PSD program. One of these requirements is that the Best Available Control Technology (BACT) be installed for all pollutants regulated under the act that would be emitted in significant amounts from new major sources or modifications. The emission sources subject to BACT review for this power plant include the two CT/HRSGs, the emergency diesel fired pump, the emergency shutdown diesel generator, and the auxiliary boiler.

New source performance standards

The CT generators are subject to the NSPS for stationary gas turbines pursuant to 40 CFR Part 60, Subpart GG, establishing NO_x and SO_2 limits from CTs.

Likewise, the project is subject to the NSPS requirements for electric utility steam generating units as defined in 40 CFR Part 60, Subpart Da, for the duct burners. These requirements place restrictions on emissions of NO_x and PM/PM_{10}.

The auxiliary boiler would also be subject to the NSPS requirements for electric utility steam generating units as defined in 40 CFR Part 60, Subpart Dc.

Acid Rain Program

The proposed facility will also be subject to Title IV (Acid Rain Program) requirements of the CAA Amendments. Under that program, the proposed facility would be required to obtain SO_2 emission allowances, if it emitted significant amounts of that pollutant.

Visibility concerns

Any facility emitting PM/PM_{10} and NO_x has the potential for adverse impact on visibility through atmospheric discoloration or a reduction of visual range due to increased haze. The CAA Amendments require evaluation of visibility impairment in the vicinity of PSD Class I Areas (generally recreation and scenic areas where visibility is important) due to emissions from new or modified air pollution sources.

Hazardous air pollutant emissions

In addition to the Federal Hazardous Air Pollutant (HAP) requirements mandated by 40 CFR Part 63 Maximum Achievable Control Technology (MACT) standards, Wisconsin has a program to regulate the emissions of air toxics. The state requirements for HAPs are found in Wis. Admin. Code ch. NR 445. Sources burning Group I fossil fuels are exempt from the emission limitations under Wis. Adm. Code § NR 445.03(4). Because the project would only combust Group 1 virgin fossil fuels (natural gas and No. 2 fuel oil), the combustion processes are exempt from NR 445 requirements.

Regardless, a facility is a major source of federally regulated HAPs if one or more federally regulated HAPs are emitted at greater than 10 tons per year (tpy) or if some and any combination of federally regulated HAPs is emitted at greater than 25 tpy.

Expected project air pollutant emissions

Hourly emissions

The proposed maximum hourly emissions of criteria pollutants plus sulfuric acid mist and beryllium from one CT/HRSG unit are tabulated in Table 3-1. The rates assume the plant to be operating with maximum duct firing. Volatile organic compound (VOC) emissions are estimated for the CT/HRSG at 80 percent of unburned hydrocarbon emissions. Fox Energy assumes "particulate matter" to be equivalent to total particulates, and designates as PM/PM_{10} for all emissions and impacts. The emergency diesel fire pump emissions estimates are based on typical manufacturer's data at 100 percent load. The emergency shutdown diesel generator emissions estimates are based on typical manufacturer's data at 100 percent load for a 725 kW engine. The auxiliary boiler emissions are estimated at 100 percent boiler load for a maximum heat input of 59.09 MMBtu/hr.

The emergency shutdown diesel generator, emergency diesel fire pump, and natural gas-fired auxiliary boiler would all emit small quantities of air pollutants relative to the emissions from the CT/HRSGs.

Table 3-1 Maximum hourly emissions from the proposed project

Pollutant	CT/HRSG Emissions (lbs/hr)	Emergency Diesel Fire Pump Emissions (lbs/hr)	Emergency Shutdown Diesel Generator Emissions (lb/hr)	Auxiliary Boiler Emissions (lb/hr)
NO_x	28.26	5.59	16.96	2.13
CO	28.67	1.00	2.96	2.66
SO_2	6.19	0.16	0.48	0.49
PM/PM_{10}	32.90	0.15	0.47	0.49
VOC	11.33	0.30	0.56	0.41
Lead	0.0003	Negligible	Negligible	Negligible
Sulfuric Acid Mist	1.82	Negligible	Negligible	0.15
Beryllium	0.00000685	Negligible	Negligible	0.000000754

Startup and shutdown emissions

The two CTs would be started and shut down periodically depending on sales and load requirements, maintenance and operating schedules. Fox Energy defines the CT startup as the period from no load to the minimum-operating load of 70 percent. Similarly, it defines CT shutdown as the reverse of startup (i.e., 70 percent load to no load).

Typically, startup is categorized into hot startup, warm startup, and cold startup. For Fox Energy, the CT/HRSG would have a hot startup when the CT/HRSG off time is less than one

hour, warm startup when the CT/HRSG off time is eight hours, and cold startup when CT/HRSG off time is 48 hours or more.

Table 3-2 lists the emissions estimates from the manufacturer per startup and shutdown of both CT/HRSG units. The duration of a hot start would be 1.15 hours, and 12 hot starts are expected per year. The duration of a warm start would be 1.82 hours, and 260 warm starts are expected each year. The duration of a cold start would be 3.2 hours, and 52 cold starts are expected per year. The duration of a shutdown would be 0.78 hours, and 324 shutdowns are expected per year.

Table 3-2 Estimated startup and shutdown emissions from the CT/HRSGs

Pollutant	Hot Start lb/startup	Warm Start lb/startup	Cold Start lb/startup	Shutdown lb/shutdown
NO_x	288.58	467.81	837.63	160.88
CO	997.41	1164.96	2192.43	520.20
PM/PM_{10}	35.95	58.02	103.79	31.25
VOC	138.16	162.06	301.61	67.55

Annual emissions

Table 3-3 summarizes the potential air pollutant emissions expected from the proposed power plant in a year. For the CT/HRSG units, the estimates assume natural gas sulfur content of 0.8 grain per 100 standard cubic feet of natural gas. Fox Energy assumed the VOC estimates for those units to be 80 percent of unburned hydrocarbon emissions. The total facility annual emissions estimates in Table 3-2 are based on two CT/HRSG units operating at 100 percent load with duct firing at the average annual ambient temperature of 44°F for 8,760 hours per year and the emergency diesel fire pump and emergency shutdown diesel generator operating for 500 hours per year. The auxiliary boiler estimates are based on it running 8,760 hours per year at 100 percent load and an average heat input of 57.94 MMBtu per hour.

Table 3-3 Estimated potential annual emissions from the proposed project facilities and the entire plant in tons/year (tpy)

Pollutant	CT/HRSG Annual Emissions (tpy)	Emergency Diesel Fire Pump Annual Emissions (tpy)	Emergency Shutdown Diesel Generator Annual Emissions (tpy)	Auxiliary Boiler Annual Emissions (tpy)	Entire Plant Annual Emissions (tpy)
NO_x	326.09	1.40	4.24	9.15	340.06
CO	512.5	0.25	0.74	11.43	529.99
SO_2	53.45	0.04	0.1	0.39	53.48
PM/PM_{10}	261.34	0.04	0.12	2.10	263.60
VOC	122.16	0.08	0.14	01.80	129.18
Lead	0.001	Negligible	Negligible	Negligible	0.0026
Sulfuric Acid Mist	50.18	Negligible	Negligible	0.61	56.01
Beryllium	0.00003	Negligible	Negligible	0.0000033	0.0000633

Annual emissions are compared with the PSD threshold emission limits in Table 3-4.

Table 3-4 Potential emissions of criteria pollutants, sulfuric acid mist, and beryllium from the proposed Fox Energy power plant, compared with PSD significant emission rates

Pollutant	Total Project Potential Annual Emissions (tons/yr)	PSD Significant Emission Rate (tons/yr)	PSD Review Required? (Yes/No)
NO_x	340.06	40	Yes
CO	539.99	100	Yes
SO_2	53.48	40	Yes
PM/PM_{10}	263.60	25/15	Yes
VOC	129.18	40	Yes
Lead	0.0026	0.6	No
Sulfuric Acid Mist	56.01	7	Yes
Beryllium	0.0000633	0.0004	No

Table 3-4 shows that the estimated emissions of NO_x, CO, PM/PM_{10}, VOCs, and SO_2 exceed the established PSD significance levels. The plant has the potential to emit more than 100 tpy of at least one regulated pollutant. By that criterion, it is considered a major new stationary source under the PSD program. As a result, the plant is subject to PSD permitting requirements codified under Wis. Admin. Code ch. NR 405, including Ambient Air Quality Impact analyses and corresponding analyses for BACT.

Air quality impact

The DNR has performed an air quality review for the Freedom site as required by Wis. Admin. Code ch. NR 405 to determine the maximum predicted impacts from the plant in relation to NAAQS, allowable PSD increments, and PSD monitoring thresholds.

The NAAQS are established by the US EPA to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, and to protect public welfare, including protection against decreased visibility or damage to animals, crops, vegetation, or buildings. Allowable PSD increments are established to prevent significant deterioration of air quality in areas with clean air, and to keep those areas in compliance with the NAAQS. The PSD increment baseline sets the amount of criteria pollutants that Fox Energy may emit before the local atmosphere has no more capacity to accept them without impact to human health. A PSD increment baseline has been established.

DNR dispersion modeling predicts that the impact of the proposed Fox Energy power plant would not exceed the "monitoring deminimis" level for any pollutants. Table 3-5 shows the concentration of pollutant in a cubic meter of air. The DNR has monitored, and will continue to monitor for these pollutants in the region, and this data can serve to estimate the pre-construction air quality.

Table 3-5 Results of PSD Class II increment analysis in micro-μg/m³ and percentage

	Pollutant Category							
	SO_2 3 hr	**SO_2 24 hr**	**SO_2 Annual**	**NO_x Annual**	**PM_{10} 24 hr**	**PM_{10} Annual**	**CO 1 hr**	**CO 8 hr**
Fox Energy sources	19.5	6.2	1.1	3.2	8.6	1.5	770.8	445.6
Monitoring deminimis	-	13.0	-	14.0	10.0	-	-	575.0
PSD Class II increment	512.0	91.0	20.0	25.0	30.0	17.0	-	-
Increment consumed	3.8%	14.3%	5.5%	12.8%	28.7%	8.8%	-	-

The maximum impact of the source itself, as shown in Table 3-5, would meet the PSD increments for all the pollutants. No additional emission sources exist near the facility, so no additional sources were included in the comparison with the NAAQS. The maximum concentration impacts of the plant in comparison with the NAAQS are listed in Table 3-6 by pollutant.

Table 3-6 Air permit modeling analysis results and percentage of the NAAQS or State AAQS for maximum power plant operations at the Freedom site.

	Pollutant Concentrations (μg/m³)								
	TSP 24 hr	**PM_{10} 24 hr**	**PM_{10} Annual**	**NO_x Annual**	**CO 1 hr**	**CO 8 hr**	SO_2 **3 hr**	**SO_2 24 hr**	**SO_2 Annual**
Fox Energy sources	8.6	8.6	1.5	3.2	770.8	445.6	19.5	6.2	1.1
Background	76.0	58.0	27.0	13.6	3,188.0	890.4	137.1	35.2	7.9
Total concentration	84.6	67.2	28.5	16.8	3,958.8	1,336.0	156.6	41.4	9.0
NAAQS (or State AAQS)	150.0	150.0	50.0	100.0	40,000	10,000	1,300.0	365.0	80.0
Percent NAAQS (or State AAQS)	56.4%	44.8%	57%	16.8%	9.9%	13.4%	12.0%	11.3%	11.3%

Tables 3-5 and 3-6 show that the proposed power plant project would not consume 100 percent of the PSD increments and would meet all the applicable National and State Ambient Air Quality Standards. In other words, significant air pollution impacts from the proposed project are not expected.

The maximum expected impact from all Fox Energy sources of ammonia (NH_3) emissions is shown in Table 3-7 in terms of the Wisconsin Acceptable Ambient Concentration (AAC)

standards for ammonia. The percentages of the state AACs over 24 hours and over one year would be low and below the threshold of concern.

Table 3-7 Air permit modeling analysis results for ammonia

	Pollutant Category	
	NH_3 **24 hr**	**NH_3 Annual**
Fox Energy sources	9.4	0.3
State AAC	432.0	100.0
Percent of state AAC	2.2%	0.3%

BACT analysis

Based on the estimated plant emissions shown in Table 3-4, Fox Energy has submitted a BACT analysis for NO_x, CO, PM/PM_{10}, VOCs, and sulfuric acid.

The following sections summarize the air pollution controls that would be installed at the Fox Energy power plant and the corresponding BACT emission levels Fox Energy proposes.

Nitrogen oxides emissions

Fox Energy proposes the following NO_x BACT emission levels or corresponding emission controls for the four identified emission sources.

1. CT/HRSGs - Dry low-NO_x burners with SCR to achieve an emission level of 3.0 parts per million volume dry basis (ppmvd) at 15 percent O_2 for a 24 hour rolling average.
2. Emergency shutdown diesel generator – Fuel injection timing retardation.
3. Emergency diesel fire pump – Fuel injection timing retardation.
4. Auxiliary boiler - Dry low-NO_x combustors and flue gas recirculation.

Carbon monoxide emissions

Fox Energy proposes the following CO BACT emission levels or corresponding emission controls for the four identified emission sources.

1. CT/HRSG - Good combustion controls and an oxidation catalyst to achieve a CO emission level of 5.0 ppmvd at 15 percent O_2 for a 24 hour rolling average. The oxidation catalyst increases the speed of conversion of CO to carbon dioxide and is anticipated to reduce emissions of CO and VOCs by approximately 80 percent.
2. Emergency shutdown diesel generator - Good combustion controls.
3. Emergency diesel fire pump - Good combustion controls.
4. Auxiliary boiler - Good combustion controls.

Particulate (PM/PM10) emissions

Fox Energy proposes the following PM/PM_{10} BACT emission levels or corresponding emission controls for the four identified emission sources.

1. CT/HRSG - Good combustion controls and an inlet air filter to achieve a PM/PM_{10} level of 0.014 lb/MMBtu.
2. Emergency shutdown diesel generator - Inlet air filtering and good combustion controls.
3. Emergency diesel fire pump - Good combustion controls.
4. Auxiliary boiler - Good combustion controls.

VOC emissions

Fox Energy proposes the following VOC BACT emission levels or corresponding emission controls for the four identified emission sources.

1. CT/HRSGs - Good combustion controls and an oxidation catalyst to achieve a VOC emission level of 3.45 ppmvd at 15 percent O_2 for a 24 hour rolling average.
2. Emergency shutdown diesel generator - Good combustion controls.
3. Emergency diesel fire pump - Good combustion controls.
4. Auxiliary boiler - Good combustion controls

.

Sulfuric acid emissions

Fox Energy proposes the following H_2SO_4 BACT emission levels or corresponding emission controls for the four identified emission sources.

1. CT/HRSGs - Good combustion controls with a natural gas sulfur content of 0.8 grain per 100 standard cubic feet of natural gas.
2. Emergency shutdown diesel generator - Low sulfur fuel oil with a maximum sulfur content of 0.05 percent by weight.
3. Emergency diesel fire pump - Low sulfur fuel oil with a maximum sulfur content of 0.05 percent by weight.
4. Auxiliary boiler - Good combustion controls with a natural gas sulfur content of 0.8 grain per 100 standard cubic feet of natural gas.

Other applicable standards and programs – conclusions

New Source Performance Standards

The potential emissions of NO_x and SO_2 from the proposed plant at this site would apparently be in compliance with the NSPS requirements. Likewise, the emissions of NO_x and PM/PM_{10}

appear to satisfy the corresponding requirements for the duct burners. The auxiliary boiler would be in compliance with NSPS requirements as well.

Acid Rain Program

Fox Energy states that, given the relatively insignificant number of SO_2 allowances required for operation of the proposed plant with natural gas, there would be sufficient allowances available on the open market at a reasonable cost to allow the plant to remain in compliance with the Acid Rain requirements.

Visibility

The proposed plant would be a new air pollution source, but there are no PSD Class I areas within 100 kilometers (about 65 miles) of either site according to the DNR. Therefore, any potential visibility impacts from the proposed power plant on Class I areas would be negligible.

Hazardous Air Pollutants

The 10 ppmvd ammonia slip emission expected from the SCR system is regulated under NR 445. The total ammonia emissions from the two CT/HRSG units are anticipated to be 67.76 lb/hr and 593,578 lb/year. The DNR has estimated total annual power plant facility emissions of ammonia to be about 593.6 tpy.

Table 3-8 contains Fox Energy's estimates of HAP emissions potential for the proposed power plant. The emission factors for each of the HAPs were obtained from the EPA document Compilation of Air Pollutant Emission Factors (EPA document AP-42).

Table 3-8 Estimated emissions in tons/year of hazardous air pollutants and comparisons with EPA thresholds

Pollutant	CT (tpy)	HRSG (duct burner) (tpy)	Emergency Generator (tpy)	Fire Pump (tpy)	Auxiliary Boiler (tpy)	Overall (tpy)	Greater than 10tpy/25 tpy (Yes/No)
1,3-Butadiene	0.008	-	-	-	-	0.008	No
Acetaldehyde	0.781	-	0.001	0.001	-	0.783	No
Acrolein	0.125	-	-	-	-	0.125	No
Benzene	0.234	0.010	0.002	0.001	0.001	0.248	No
Formaldehyde	2.771	0.375	0.002	0.001	0.021	3.170	No
Naphthalene	0.025	0.003	-	-	-	0.029	No
Propylene Oxides	0.566	-	0.005	0.002	-	0.573	No
Toluene	2.537	0.017	0.001	-	-	2.555	No
Xylenes	1.149	-	0.001	-	-	1.250	No
Ethyl benzene	0.625	-	-	-	-	0.625	No
Polycyclic Aromatic Hydrocarbons	0.043	-	-	-	-	0.043	No
Dichlorobenze1ne	-	0.006	-	-	-	0.006	No
Hexane	-	8.995	-	-	0.495	9.491	No
Arsenic	-	0.001	-	-	-	0.001	No

Pollutant	CT (tpy)	HRSG (duct burner) (tpy)	Emergency Generator (tpy)	Fire Pump (tpy)	Auxiliary Boiler (tpy)	Overall (tpy)	Greater than 10tpy/25 tpy (Yes/No)
Cadmium	-	0.005	-	-	-	0.006	No
Chromium	-	0.007	-	-	-	0.007	No
Lead	-	0.002	-	-	-	0.002	No
Manganese	-	0.002	-	-	-	0.002	No
Mercury	-	0.001	-	-	-	0.001	No
Nickel	-	0.010	-	-	0.001	0.011	No
Total Sum (tpy)	**8.965**	**9.437**	**0.012**	**0.005**	**0.519**	**18.937**	**No**

As shown in Table 3-8, no individual HAP is expected to be emitted in excess of the major source threshold of 10 tpy. The individual HAP with the greatest emission potential is hexane with a potential of 9.491 tpy. No combination of HAPs is expected to be emitted in excess of 25 tpy. The project has the potential to emit 18.937 tpy of all HAPs combined. Because the potential emissions of all HAPs, either individually and combined, are less than the major source thresholds, the MACT requirements are not applicable to this project.

Permit status

The DNR Air Pollution Control Construction Permit and Operating Permit (Numbers 00-RV-170 and 00-RV-170-OP) have been drafted and have completed the required public comment period. It appears that the facility can be permitted as proposed.

Geology

The Freedom site is located in an area of thick glacial deposits. These unconsolidated surficial deposits are underlain by sedimentary bedrock of the Cambrian and Ordovician periods. Depth to bedrock is a minimum of 50 feet. High-capacity wells in this region pump groundwater from aquifers within the bedrock. The Cambrian-Ordovician aquifer system contains the major water bearing units in the vicinity of the proposed project site. Construction reports for area wells show depth to bedrock near the site to be approximately 50-100 feet.

Impacts after construction

Construction of a power plant would not affect the area's geology. There would be no high-capacity well at the proposed site.

Topography

The proposed Freedom site is generally flat with a gentle slope from northwest to southeast and west to east. The site and the surrounding area slope toward tributaries of Apple Creek. The approximate elevation of the proposed site is 725 feet above mean sea level (MSL).

Impacts after construction

Construction of a power plant would change the topography slightly. The ground would be made more level for buildings and to further manage run-off water. Because the site is nearly flat, the potential for erosion due to construction activities is low. Further, the facility would have to follow a DNR-issued storm water management plan that meets local and state standards.

Soils

The Freedom site is covered by three different soil series: the Kewaunee, Manawa and Poygan series. In basic terms, a soil series is a grouping of soils developed from the same parent material and formed under the same processes. Soils within the same series have similar physical, chemical and morphological characteristics. Most soils in Outagamie County were derived from either material deposited by the glaciers or material deposited as lacustrine (of or relating to lakes) sediment.

The Freedom site is predominantly covered by the Manawa series. Soils in this series consist of deep, somewhat poorly drained soils. These soils consist primarily of silty clay loam, silty clay and clay. Manawa soils have a severe rating for shallow excavation and dwellings without basements, such as the proposed generating facility. The severe rating for this soil series is due to the soil's susceptibility to wetness, flooding and high clay content.

The Kewaunee and Poygan soil series are also found on the site, in smaller distributions. The Kewaunee series consists of deep, well drained or moderately well drained soils and are made up of silt loam, silty clay, silty clay loam, and clay. These soils are rated severe for dwellings without basements and shallow excavations due to high clay content, low strength and shrink-swell characteristics. The Poygan series consists of deep, poorly drained soils and are comprised of silty clay loam, clay and silty clay. These soils have the same limitations as those exhibited by the Kewaunee and Manawa soils.

According to the Soil Survey of Outagamie County, Wisconsin, all three soil series have moderate erodibility factors and the soils should not be left exposed after construction of the plant and surrounding landscape are completed.

Impacts during and after construction

The soils on which Fox Energy would build could cause construction difficulties due to individual soil property limitations. Construction would remove, compact, and mix soil profile layers. Any equipment operated during wet periods on these poorly drained soils would potentially damage their structure. Construction and landscaping efforts should avoid compaction that would damage soil percolation and should avoid causing erosion of soil that would fill site drainage ditches.

Outagamie County was entirely forested before European settlement took place. In the northern portion of the county, the forest composition was mixed conifer-northern hardwood forest. Central hardwood forest covered the southern part of the county. The Fox Energy plant

and surrounding facilities would remove substantial acreage from production of row crops and wild or weedy vegetation. Productive soils removed for construction of buildings, substations or access roads could be retained on site and used to revegetate the resulting landscape with native plantings. It is unlikely that planting crops would be a practical use of the land, but planting native hardwoods such as sugar maple, red maple, green ash and white ash would restore natural features once present on the site. Additionally, directly west of the Freedom site, native stands of trees exist. The plantings could help beautify and screen buildings, abate noise, and restore some natural character to the landscape.

Water resources

Watershed and floodplain

The Freedom site is located in the Fox River watershed. The Fox River is approximately 4.6 miles south of the proposed site. The site currently drains from west to east, northeast. This site, currently in agriculture but not tiled for drainage, drains to the east through an open drainage ditch to a tributary of the north branch of Apple Creek. The drainage ditch bisects the proposed site west to east, runs south along the west side of STH 55, continues east under STH 55 into adjacent agricultural lands and joins an unnamed tributary to the north branch of Apple Creek. This tributary continues east through the Fox Valley golf course before joining the main branch of Apple Creek just north of the intersection of USH 41 and CTH U. Apple Creek continues east to its confluence with the Fox River, approximately 1.7 miles north, northeast of Wrightstown. According to the Outagamie County Flood Insurance Rate Map (FIRM), the proposed Freedom site lies outside of the Duck Creek and Apple Creek floodplain boundaries.

Wetlands

The DNR Wisconsin Wetlands Inventory (WWI) maps do not indicate the presence of any wetlands greater than 2.0 acres in size on the proposed site. Additionally, no protected resource waters have been identified on the site or identified as having the potential to be impacted by site operations.

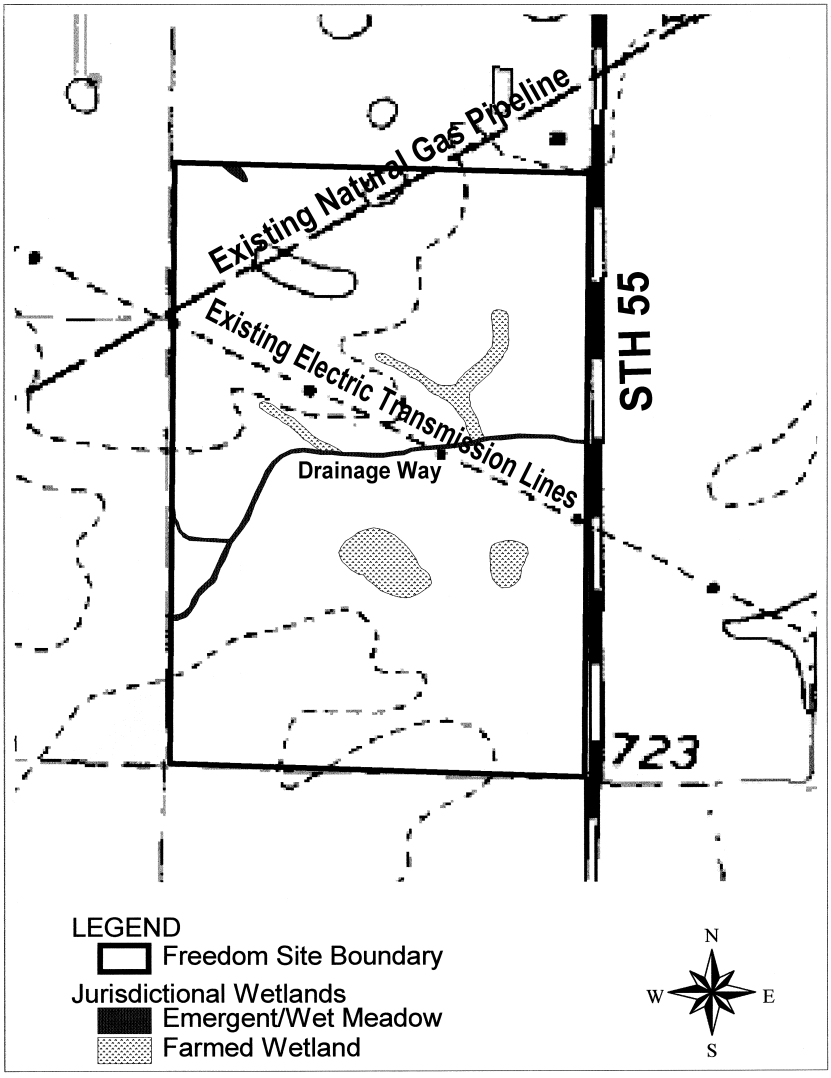
Fox Energy conducted a wetland identification and delineation survey in July 2000 to determine the number, size and location of any jurisdictional wetlands on the proposed Freedom site. Consistent with both state and federal guidelines, sampling points were established across the site, and vegetation, hydrology and soil conditions were recorded for each point. A determination based on this data was made as to the presence or absence of jurisdictional wetlands.

The wetland survey identified six areas as possible jurisdictional wetlands. Two of these areas were associated with agricultural drainage channels while the remaining four were characterized as depressional areas with active agriculture. The two drainage channels were classified as persistent emergent/wet meadow. The four areas tentatively identified as "farmed wetlands," as defined by the Natural Resources Conservation Service (NRCS), were further evaluated for soil composition and vegetative cover. Based on local soil and wetland information, the soils in these areas are characteristic of the Poygan hydric soil series. If these areas were taken out of

agricultural use, it is likely that hydrophytic/wetland vegetation would develop and dominate these sites.

In total, 2.7 acres of jurisdictional wetlands were identified on the proposed Freedom site, including the drainage channels that run roughly east-west through the site (see Figure 3-2). Fox Energy states that it does not intend to impact any protected wetlands either by constructing buildings or as the result of construction-related activity. To ensure no impact on such wetlands, Fox Energy has stated that it would isolate and protect these areas with orange fencing to ensure no construction activities encroach on these areas. The isolation of protected areas would be in accordance with standard practices set forth by the ACOE. In that case, Fox Energy may have to secure state and/or federal approval to build on or fill in any wetlands.

Figure 3-2 Freedom site jurisdictional wetlands



Groundwater

Direct, significant impacts to groundwater are not anticipated for this proposed project. The raw water supply for the power plant operation would be transported by pipeline from the HOV. A shallow, 100 to 200 foot, on-site well would be drilled to supply potable water for domestic uses such as drinking water, showers, toilets and sinks. The well would have consumptive uses of approximately 1 to 20 gallons per minute (gpm). No high-capacity well is proposed for this site.

If the Freedom site is approved and a private potable well is installed at the plant, the regional groundwater arsenic problem in the town may become a concern.

Heart of the Valley (HOV)- the water source for steam production and for cooling

The HOV, under an agreement with Fox Energy, would provide the raw water supply for the proposed Freedom site. A discussion of the HOV facility as the Fox Energy water source can be found in Chapter 2. The products and by-products of Fox Energy's treatment of that water is also discussed. Fox Energy's operations require further treatment of the HOV effluent.

Fox River description of the discharge environment

Location

Regardless of the site selected by the Commission, the Fox Energy power plant would discharge water at a point in the Fox River about 1,500 feet south of the proposed Kaukauna site (see Figure 3-3) along an existing high-voltage transmission line ROW upstream from the Rapide Croche dam.

Flow

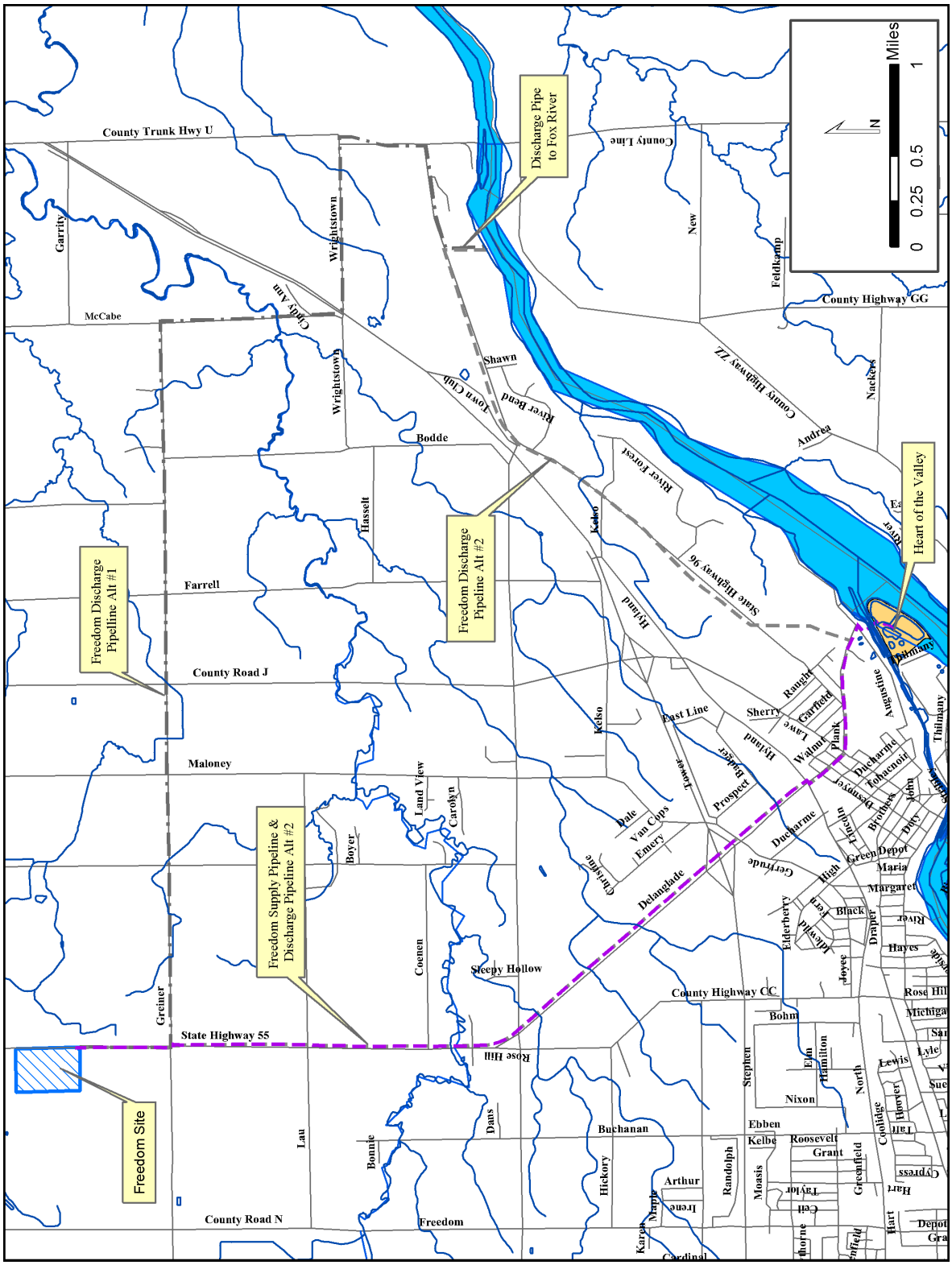
The average annual flow of the Fox River at this point is about 2,940 MGD. The projected maximum water loss of 4.28 MGD is less than one percent of the river's 7Q10 value (lowest flow for a seven-day period over ten years) of 952 cubic feet per second (cfs) at this location.

Sediment

Recent sediment surveys of the river indicate that sediment deposition is occurring in the stream reach of the river where the discharge would be. Deposition is occurring partly because of a relatively small bed slope and partly because of the existence of the Rapide Croche dam on the downstream side. In this reach, the thickness of the river bed sediments above a relatively hard clay pan ranges from about 6 inches to about 1.5 feet. Earlier sediment deposits between the hard clay pan and bedrock are reported to be several feet thick.

Two relatively large lakes (Lake Winnebago and Little Lake Butte Des Morts) and nine dams are located within about 15 miles upstream of the site. These structures trap a significant portion of the suspended sediments and bed load transported by the river during normal, low, and high flow conditions. Consequently, stream flows passing through the discharge site vicinity have a relatively light sediment load for such a large river. The fact that there has been 6 inches to 1.5 feet of sediment deposition in this stream reach suggests that the river flow velocities have not been large enough for the river itself to cause scouring.

Figure 3-3 Freedom site water pipeline routes



Based on recently surveyed cross sections of the river in the vicinity of the proposed outfall, the average cross sectional area and top width of flow at the low pool elevation of 602.1 feet are estimated to be about 4,868 square feet and 540 feet, respectively. The average depth along the cross section and hydraulic radius are estimated to be about 9 and 8.7 feet, respectively. Most of the river bed sediments at the location of the pipe outlet appear to have been deposited in a flow regime with velocities of 0.20 to 0.93 feet per second (ft/sec).

Biological environment

At the request of the DNR, Fox Energy conducted seasonal biological surveys of the potentially-affected reaches of the Fox River near the proposed discharge point.

Benthic macroinvertebrates were sampled in the study area on May 14 and July 23, 2001. Sampling was done with a petite ponar dredge at three transect locations across the Fox River (upstream, downstream and at the proposed discharge). Each transect consisted of three sample locations, near shore, intermediate depth and mid-channel. The survey results were consistent in finding the most common family of benthic macroinvertibrates collected were chironamids (midge larvae), up to 67.9 percent, followed by oligochaetes (aquatic worms) in the Tubificidae and Naididae families. Chironamids and oligochaetes combined made up as much as 96.4 percent of the total organisms found. Average abundance and taxa richness was found to be greatest at the near shore locations.

By assigning tolerance values to the identified families of macroinvertebrates collected, a family level biotic index (FBI) value was calculated for each sample location. Average FBI values for each location indicated "very poor" water quality or habitat for all locations except the upstream mid-channel sample, which indicated "poor" water quality or habitat.

The presence of aquatic macrophytes (rooted plants) was surveyed at the same time as the macroinvertebrate and fish surveys were conducted. Using a ponar dredge and a rake, various depths and locations were sampled. Results found a very limited amount of pondweed (*Potamogeton species*) in the near shore area in less than three feet of water both upstream and downstream of the proposed discharge structure. No macrophytes were found within 400 feet of the proposed outfall.

Fisheries assessments were conducted in the study area over a one-year period.

Trap net surveys were conducted during May, July, and October in 2001 to assess the warm water adult and juvenile fish community. Additional trap net surveys were conducted in March and April of 2002 to assess cool water spawning species (northern pike and walleye). In addition, electrofishing surveys, to determine relative abundance of species, and seine hauls, to better characterize juvenile fish, were conducted during each of the sampling events. Larval fish were collected weekly from May 2001 through July 2001, every other week in August 2001 and weekly from the beginning of April through mid May 2002.

Results of the trapnet and electrofishing surveys showed smallmouth bass, bluegill, and black crappie as the dominant gamefish/panfish with channel catfish and flathead catfish also commonly found. Northern pike and walleye were found in very low abundance during the

spring trapnet surveys. Their presence in low numbers plus the lack of appropriate spawning substrate and habitat for these species indicated limited, if any, use of the area for spawning activity. The most common rough fish found were carp and shortnose gar, with carp being dominant.

The primary forage species based on trapnets, seines, and electrofishing appeared to be emerald shiner, gizzard shad, trout perch and spottail shiner. Larval fish collections suggest that yellow perch, black crappie, bluegill, and unknown cyprinids (most likely carp) are spawning within the area or within the pool of the proposed outfall.

Fox Energy discharge and potential impacts

Discharge structure construction and operation

The discharge pipe opening would be about one foot above the river bottom and approximately 125 ft from the north bank of the river at the normal pool elevation of 605.5 feet or about 96 feet from the north bank at the low pool elevation of 602 ft. The pipe opening would be about 9.5 feet below the water's surface. This position should present no hazard to navigation (see Figure 3-4).

A 20- by 20-foot riprap pad, 12 inches of angular riprap over six inches of gravel, would put about 23 cubic yards of rock on the river bed. In order to install the riprap pad, the river substrate would need to be dredged to a depth of about one foot in the area of the pad. Approximately 15 cubic yards of river sediment would be excavated. Contractors would use a backhoe on a barge to remove dredge material. Prior to dredging, a silt curtain would be installed in the water column to minimize downstream movements of suspended sediments. Excavated material would be brought to the surface and placed in a roll-off box on the barge. Dredge material would be transferred to the plant construction site where it would be dewatered. Both the water and drained sediment would be tested for the presence of hazardous material to ensure proper disposal.

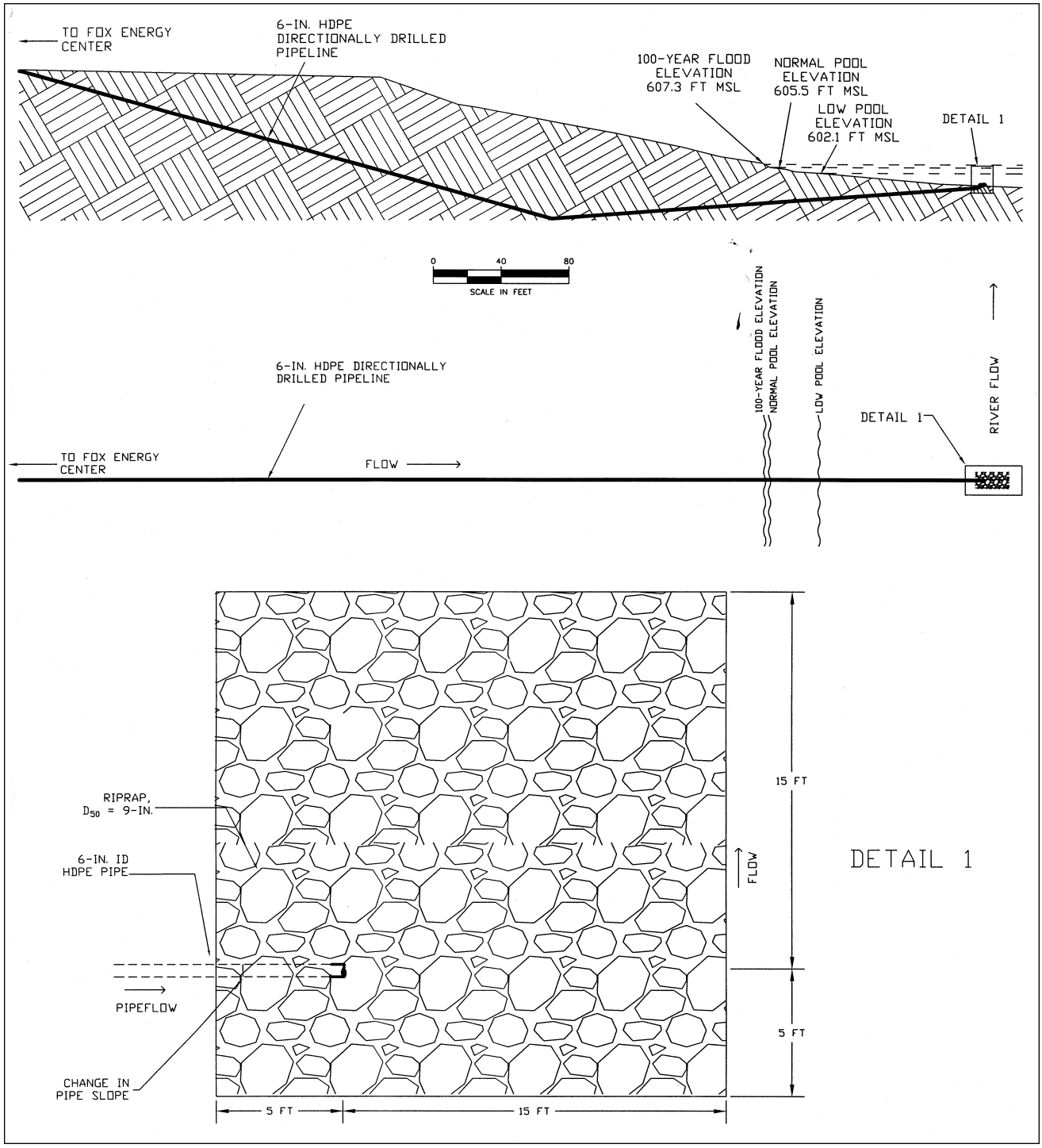
If possible, Fox Energy would build the discharge structure during low-flow periods, typically in late summer. The structure installation could take between one and two weeks.

Water loss

Because much of the HOV discharge diverted to the Fox Energy power plant would be lost to evaporation, the total discharge to the Fox River system for HOV and Fox Energy would be reduced. Under worst-case electrical conditions (a hot summer day), 3.48 million gallons per day of water would evaporate from the cooling towers. An additional 10,000 gallons per day of water droplets, known as drift, would also be lost to the atmosphere. Water loss from the cooling towers would account for about 81 percent of the water loss through the power plant. Additional losses include:

- Under peak energy demand on hot summer days, combustion air for the combustion turbines might be pre-cooled by water in an evaporative cooler. Evaporation of some of the water would be a loss of about 70,000 gallons per day.

Figure 3-4 Water outflow into the Fox River



- An additional 100 MW of peaking capacity can be achieved using steam augmentation and duct firing. Under these conditions, about 670,000 gallons per day of water vapor can be lost to the atmosphere via turbine exhaust.
- Steam and vent losses in the conventional steam cycle portion of the power plant could add 40,000 gallons per day of water vapor lost to the atmosphere.

Summing the above losses, the total water loss to the atmosphere under peak energy demand conditions could be 4.3 MGD. It is not possible to quantify how much, if any, of this water would return to the Lower Fox River water basin via condensation and precipitation.

To prevent the build up of dissolved solids in the recirculating cooling tower water, 1.1 million gallons per day would be continuously bled from the tower, and discharged to the Fox River. This is called tower blowdown. Since the blowdown ultimately would come from the effluent supplied by HOV, which would otherwise be discharged to the Fox River, this is not considered part of the water loss.

The projected maximum water loss of 4.3 MGD is less than 1 percent of the 7Q10 low flow of the Fox River (952 cfs) at this location. There is no expected environmental impact from water loss to the Fox River system caused by the proposed Fox Energy project.

Thermal mixing

Changes in water temperature created by industrial discharges can have a serious impact on aquatic life.

A model has been examined for the critical condition where the low 7Q10 stream flow and lowest stream temperature expected are combined during a time when the discharge is at its maximum temperature. These conditions represent a warm day in March or April with a maximum effluent temperature of 35 C (95 F) and Fox River temperature of 10 C (50 F). The large flow in the Fox River, compared to the proposed discharge flow, would combine with a proposed submerged outflow structure diffuser to provide immediate mixing that would reduce the size of the thermal mixing zone and reduce the potential for impact to aquatic life.

The location and orientation of the proposed "single port" diffuser would cause the discharge to begin in the river as a jet perpendicular to the current of the river, aimed 30 degrees up from the river bottom. Under the above worst case conditions, the jet would reach the river surface at a horizontal distance of 8.4 feet from the end of the pipe. There, the initial discharge velocity would dominate the mixing of the discharge with the river current, and the current would deflect the jet very little. The average dilution across the jet as it contacted the river surface would be 3.6 to 1. At the worst case temperature extreme of the discharge, 45°F above river temperature, the temperature difference as the discharge reaches the surface would be reduced to 12.3°F.

After contact with the river surface, the discharge would go through a short transition phase and become a buoyant surface plume. The effect of the discharge velocity would be reduced, and the plume would bend in the direction of the river current and spread out along the surface of

the river. There, the rate of mixing would be slower than in the initial jet region. By the time the discharge plume were 91 ft downstream, the average temperature difference in the plume would be reduced to 3° F. The floating plume at this point would be approximately 63 ft wide and would not have contacted either shore. The portion of the total stream width with the 3°F temperature rise would be 12 percent of the total width of the river. Less than 1 percent of the cross-sectional area would be affected.

Wis. Admin. Code § NR 106.06(3) allows credit for some mixing of the effluent with the receiving water for the calculation of effluent limits based on acute toxicity to aquatic life provided a number of conditions are met. The discharge velocity must be at least 10 feet per second (ft/sec) to insure rapid mixing, and the size of the zone allowed for mixing is limited by a number of factors. Fox Energy has proposed a cyclical on/off discharge using a flow equalization tank to maintain the 10 ft/sec discharge velocity. Details of the design have not been determined. The DNR will have to review the final design to verify that a minimum discharge velocity of 10 ft/sec will be maintained during times of discharge and that leakage when the system is not operating is be eliminated. If the discharge system design can maintain a 10 ft/sec discharge velocity, the proposed project will not pose a significant threat to aquatic life due to temperature changes in the Fox River.

Scouring

The potential scouring action created by industrial discharge into water bodies can result in significant erosion of sediments along a river bottom, which in turn could negatively impact aquatic biota downstream as the material settles out. Discharge structures can be designed to minimize and dissipate the rate of effluent outflow into the river so as to avoid scouring. An analysis was conducted to evaluate whether the proposed discharge velocity of 10 ft/sec had the potential to cause significant scour and sediment movement in the vicinity of the proposed discharge outfall.

As discussed above in the description of the river environment, recent sediment surveys of the Fox River indicate that sediment deposition is occurring in the stream reach at the discharge location. Most of the river bed sediments at the location of the pipe outlet appear to have been deposited in a flow regime with velocities of 0.20 to 0.93 ft/sec. Flow velocities in excess of these values are likely to erode these sediments.

Scour analysis suggests that the potential for scour at the discharge and downstream from the discharge can be minimized by constructing a riprap skirt or apron around the discharge structure that can withstand a discharge velocity of 10 ft/sec. DNR estimates that the 20- by 20-foot riprap pad would be appropriate around the base of the outlet to minimize scour.

Biological impact

A 1.5-inch copper or brass mesh screen over the pipe outlet would restrict adult fish entry into the pipe during no-flow periods. The combination of high effluent flow velocity and the biocidal screen would prevent zebra mussel colonization in the pipe and on the screen.

At the request of the DNR, Fox Energy conducted seasonal biological surveys of the potentially-affected reaches of the Fox River near the proposed discharge point. The ultimate purpose for

the surveys was to characterize the existing aquatic life adequately, and to allow the DNR to determine if the project might negatively affect habitats and organisms downstream from the discharge structure.

An assessment of the 2001 data suggested that the proposed project is unlikely to cause any significant adverse environmental impact to aquatic biota in the Fox River.

On May 6, 2002, the company submitted a draft report to the DNR on the physical and biological characteristics of the river. Based on this information, the DNR reached a preliminary conclusion that the aquatic biological impacts as a result of the proposed discharge would be minimal. The average abundance and taxonomic richness of the benthic macroinvertebrates was found to be greatest at the near shore sample locations. Water quality and/or habitat in the discharge area were found to be very poor to poor. No macrophytes were found within 400 feet of the proposed outfall. With regard to fish, the proposed outfall would be located in 9 to 10 feet of water, substantially removed from the near-shore area where fish abundance is highest, and most of the limited habitat would be available. Potential impacts to fish within the zone of discharge would be minimized, and the thermal plume would not extend to the near-shore areas.

Water pipeline routes and construction

The proposed power plant would require two water pipelines: one for the supply water and one to discharge water into the Fox River. (See Chapter 2 for a detailed discussion of water needs, uses, treatment, and storage.) Water would be delivered to the Freedom site through a buried 24-inch diameter HDPE pipeline. Discharge water would be carried to the Fox River by way of a buried 10-inch diameter HDPE pipeline (Route Alternative 1) or a buried 12-inch diameter HDPE pipeline (Route Alternative 2).

Pipeline ROW

Fox Energy proposes to locate water pipelines primarily within existing road ROW. As a merchant plant, Fox Energy is, by DOT policy, prohibited from placing facilities inside the public ROW of state highways. This prohibition can be waived if state and federal highway authorities determine that the use of the public ROW is in the public interest and will not impact the highway or interfere with the free and safe flow of traffic. Without an exemption from state and federal highway authorities, the pipeline would need to be located just outside the road ROW, entirely on private land. Construction requirements and methods for the water pipelines are discussed in detail in Chapter 2. The amount of private land needed for permanent and temporary construction easements would vary depending on whether the pipeline can be placed within the road ROW and the actual width of the road ROW. Combined, the permanent and temporary easement needs on private land would vary between 35 and 50 feet wide. Permanent easements could vary from 21 to 35 feet wide (see Chapter 2 for a detailed discussion of pipeline ROW requirements).

General pipeline environmental impacts

Large pipelines create linear corridors that can result in significant environmental impacts in vulnerable environments. In this case all the proposed water pipeline routes follow primarily existing road or transmission line ROW. In addition, the landscape has already been

significantly altered from its pre-settlement condition and is dominated by agricultural, residential, and commercial development. While there are a number of environmental concerns associated with the pipelines, most of the impacts would be short term and can readily be managed and mitigated with proper planning and by use of techniques designed to minimize environmental impacts. For any pipeline approved in this project, landowners could seek protection against construction impacts and possible future impacts by placing requirements for post-construction land treatment and remedies for accident and future repair activities in an easement contract.

Trench and boring construction methods would require significant excavation. Adverse environmental impacts can result from soil erosion and improper backfilling and post-construction soil treatment. Soil erosion can adversely affect streams and wetlands in and near the project area. Improper backfilling where top soil is not returned to the surface could adversely affect soil fertility and make reestablishment of desirable vegetation difficult. Soil compaction caused by heavy equipment could also reduce the soils ability to sustain vegetation and conduct or hold water. Control of soil erosion using methods outlined in the DNR's Best Management Practices (BMP) guide are required under the stormwater general permits to insure against adverse affects from soil erosion. Top soil should be separated from the soil removed from trenches and pits and returned to the surface above the trench or pit after the pipe has been set in place. Soil compaction can be addressed by using proper cultivation methods that aerate and loosen the soil after construction is complete.

Impacts to residents and landowners during construction

Construction of the water pipelines would take approximately two months. The construction would be scheduled for summer months to facilitate maximum construction efficiency. If the Commission approves this project, the construction of the pipelines is likely to take place during the summer of 2003.

Impacts to traffic

Some impact to traffic flow would be expected during construction of the pipelines. Most construction activities would be conducted on private property under easement agreements. However, access to easements and movement of machinery could at times affect traffic flow. Fox Energy indicates that interference with normal traffic flow would be minimized to the greatest extent possible.

Impacts to access

During construction, access to homes, properties, and businesses would be restricted. In order to minimize inconvenience, Fox Energy would notify residents and business owners at least two days prior to the day access would be affected. It is anticipated that each driveway would be inaccessible for no longer than two hours when the trench is cut and two hours when the trench is back-filled. The contractor would be required to use traffic plates to provide access to properties when excavations are open. Fox Energy has stated its intention to perform these operations during periods when demand for access to properties is low.

The company and its contractor would work to facilitate continued access to businesses during construction. When a business's access drive is blocked, alternate access would be provided to

the maximum extent practicable. If no other access were possible, Fox Energy would keep the interruption to traffic access as short as possible. This could be accomplished by scheduling the interruption to off-business hours for the affected establishment.

Construction requirements

The contractor would be required to comply with local, state, and federal safety regulations. The contractor would not be allowed to open any more trenches than necessary to expedite the work. Trenches would be covered with traffic plates as required to provide access to properties. In most cases, trenches would be cut and back-filled in the same day. The contractor would be required to minimize the amount of trenching left open over night. In cases where a trench must be left open, the contractor would be required to secure the area by surrounding any open trenches with orange construction fencing.

Pipeline routes

Water supply pipeline route

Figure 3-3 shows the location of the supply and discharge pipeline routes. The supply pipeline would exit HOV heading north to Augustine Road. To do this the pipeline would pass under the Fox Energy lock system just north of HOV. This would be accomplished by directional boring, which would require a permit from the ACOE that was issued on January 22, 2002. The pipeline would then follow the south side of Augustine Road heading east to Plank Road. From there, the pipeline would follow the south side of Plank road heading west to Hyland Road. At Hyland Road, the pipeline would switch to the north side of the road and continue heading west along Delanglade Road. The pipeline would continue along Delanglade Road past CTH J, where it would continue heading north along the east side of STH 55. At Greiner Road, the pipeline would switch to the west side of STH 55 and continue north to the Freedom Site. This pipeline route would be approximately 5.8 miles in length.

Discharge water pipeline routes

Two routes for the discharge pipeline are being considered for the Freedom site. The discharge pipeline would require a 10- or 12-inch diameter HDPE buried pipe. The discharge point in the Fox River would be the same as for the Kaukauna site, about 1,500 feet due south of the Kaukauna site (see Figure 3 -3).

Alternative Route 1 for the discharge pipeline would proceed south from the Freedom Site, on the west side of STH 55. Between the Freedom site and Greiner Road, the discharge pipeline would be placed alongside and in the same trench as the supply water pipeline (see Figure 2-10). At Greiner Road the pipeline would turn east along the north side of Greiner Road to McCabe Road where it would turn and run south along the east side of McCabe Road. At Wrightstown Road, the pipeline would pass under USH 41 and head east along the north side of Wrightstown Road. At CTH U, the pipeline would turn south and follow along the west side of CTH U to STH 96. At STH 96, the pipeline would turn west along the south side of STH 96 and proceed for about 0.6 mile to the existing 345 kV high-voltage transmission line ROW. At the transmission line ROW, the pipeline would turn south and proceed to the river, which is approximately 1,300 feet south of STH 96. This pipeline route would be approximately 7.5 miles in length and share about 0.5 mile of ROW with the supply pipeline route. It would use a 10-inch diameter HDPE pipe.

Alternative Route 2 for the discharge pipeline would travel south alongside the proposed water supply pipeline route described above to the point where an existing 138 kV transmission line ROW crosses Plank Road just northeast of the HOV treatment plant. The pipeline would then follow the transmission line ROW north to STH 96, where it would turn east along the north side of STH 96. It would follow STH 96 for approximately 2.75 miles and then turn south towards the Fox River following the existing 345 kV transmission line ROW (see Figure 3-3). This pipeline route would be approximately 8.6 miles in length but would share a ROW with the water supply pipeline for about 5.4 miles. It would be built with a 12-inch diameter HDPE pipe.

Pipeline agricultural impact

In general pipeline impacts can affect farming operations during construction and can affect the land's ability to produce crops in the future if improper construction methods are used. Impacts can include crop loss from construction activities and loss of soil fertility through soil compaction or improper management of top soil. Because top soil would be separated from subsoil and returned to the surface after the trench is backfilled, loss of soil fertility is unlikely. The effects of soil compaction from heavy equipment can be reduced or eliminated with proper post construction soil treatment. The entire easement width can be cultivated using chisel plows and repeated disking. There appear to be no buried irrigation systems along the pipeline routes. In the event of any damage to existing irrigation tile, Fox Energy says it would promptly repair and restore damaged tile to its original or better condition. Because farming practices are generally allowed to continue after a pipeline is installed, it is unlikely that any long-term agricultural impacts would result. Possible impacts could result in future years should the pipeline break or need repair.

Supply water pipeline

Figure 3-3 shows the locations of the supply pipeline. About 49 percent (2.9 miles) of this route passes through agricultural land. Combining both the temporary and permanent easement requirements, the pipeline construction could affect a maximum of about 17.5 acres of farm land. Because construction is planned for summer, it is possible that some crops may be lost. Companies building pipelines generally compensate land owners for the value of crops lost or damaged during construction. Compensation is agreed upon during easement negotiations. Since all construction would be conducted along roadways, the overall agricultural impact is likely to be small and temporary. Long term impacts are not likely. If tillable fields are affected, normal row crop farming practices can generally be resumed after the pipeline is completed. Long-term impacts are not expected.

Discharge water pipeline

About 85 percent (6.3 miles) of discharge pipeline Alternative Route 1 passes through agricultural lands. The combined area of impact from temporary and permanent easements would be about 39 acres.

Approximately 54 percent (2 miles) of discharge pipeline Alternative Route 2 passes through agricultural lands. The combined area of impact from temporary and permanent easements would be about 12 acres.

Impacts to agricultural lands would be the same as those discussed previously.

Pipeline residential impact

Short-term impacts could include limited access to property during construction, dust, temporary loss of vegetation, and noise. Long-term impacts could occur because permanent easement lands must be cleared of large trees. Fox Energy has committed to returning the land (including driveways) to its original or better condition at the end of construction. Long-term impacts would also include restrictions on land use that would be described in easement agreements. Typically these restrictions prohibit the construction of buildings and limit the types of plantings on easement lands. Fox Energy has committed to work with landowners to return their affected property to an acceptable condition. This would include the use of landscaping plantings.

Supply pipeline

About 27 percent (1.5 miles) of the supply pipeline route passes through residential areas. Total areas of residential impact could amount to a maximum of 9.5 acres. Less land may be required in areas where the pipeline could be installed inside the road ROW. Impacts to residents are generally largely temporary. However, any large trees in the easement ROW would be removed. During construction, access to properties would be disrupted for short periods of time.

Discharge pipelines

About 13 percent (1 mile) of discharge pipeline on Alternative Route 1 passes through residential areas. The total area impacted could be about 5.7 acres.

About 19 percent (0.7 miles) of discharge pipeline on Alternative Route 2 passes through residential areas. A total of about four acres could be affected.

The impacts for the discharge pipeline would be the same as for the supply water pipeline. No long-term impacts are expected for either discharge pipeline.

Commercial/Business impact

Supply water pipeline

About 22 percent (1.3 miles) of the route would affect business and industrial properties. The primary impacts to businesses along the route would be temporary. A major short-term impact could be the disruption of easy access to business properties. As with residential areas, the amount of time that individual driveways would be affected is relatively small. Fox Energy has said it would work with businesses to reduce the disruption associated with construction to the smallest time possible. Temporary access to properties would be provided and driveways would be repaired as soon as possible after construction. There would be no significant long-term impacts associated with the pipeline. See Chapter 2 for a discussion of the construction process.

Discharge water pipelines

Neither discharge pipeline passes through commercial areas. Neither would add additional impacts to commercial properties.

Wetland impact

Wetlands and streams can be damaged by pipeline construction activities either directly or indirectly. In general, all stream and wetland crossings for pipelines are fairly narrow. Affected

wetlands in the area consist primarily of wooded wetlands immediately adjacent to streams. Direct impacts occur when open trenching methods are used and when construction vehicles are driven through streams and wetlands. These kinds of activities can negatively affect the aquatic plants and animals present in the affected waters. For this project, Fox Energy would not use open trench construction methods in wetland or streams. Instead, Fox Energy proposes to use directional boring methods to place the pipeline below wetlands and streambeds. The use of directional boring is an effective method for reducing direct environmental impacts to streams. Long-term impacts may include the permanent removal of trees along streams and rivers. These impacts can be limited by choosing routes that minimize the number of stream crossings and by choosing areas where forest cover is already disturbed or very narrow. Releases of drilling fluids can cause vegetative effects by covering vegetation and blocking surface water flows.

Indirect impacts to streams and wetlands occur when nearby construction activities lead to soil erosion. In this case, the large amounts of exposed soil resulting from open trench construction activities and bore pit excavations would be susceptible to erosion. The applicant would need to use standard erosion control methods at all times during and after construction. Standard control methods such as the DNR's BMP should be employed throughout and immediately after construction until exposed soil has been stabilized by vegetation. This would include areas where pits are dug in order to bore beneath streams and wetlands.

Water supply pipeline wetland/stream Impact

A little over 1 percent (353 feet) of the supply pipeline route would affect wetlands. Five wetlands or streams could be affected. These wetlands are associated with permanent and temporary streams that cross pipeline routes. The supply water pipeline crosses Apple Creek along STH 55. Because the pipeline will be bored under streams and wetlands, little short or long term damage is expected. Soil erosion should be carefully controlled.

Discharge water pipeline wetland/stream Impacts

About 0.5 percent (217 feet) of discharge pipeline on Alternative Route 1 passes through streams or wetlands. There would be eight stream/wetland crossings along this route. One of the crossings is common to both Alternative Route 1 and the supply water pipeline. Discharge pipeline Alternative Route 1 crosses Apple Creek along McCabe Road.

About 0.5 percent (113 feet) of discharge pipeline on Alternative Route 2 passes through streams or wetlands. This pipeline would cross seven streams or wetlands, and five of those crossings would be common to both Alternative Route 2 and the supply water pipeline.

Forest impact

The pipeline would require removal of all trees within the permanent pipeline ROW. Because large growing trees are incompatible with permanent ROWs, pipeline impacts to forests and woodlands can be severe. Some wildlife habitat would be lost with the removal of trees. Additional loss of wildlife habitat in highly developed areas can be significant as the remaining habitat becomes more and more scarce and vulnerable. However, the largely developed nature of the project landscape and the location of pipeline routes along roads also mean that larger woodlots and forests would not be affected by this project.

Forestry impacts are potentially the greatest near streams and in residential areas where ornamental or large trees near roads might be affected. Because large trees cannot be permitted on permanent pipeline ROW, impacts from construction could be reduced by using existing ROW and avoiding forested areas as much as possible in route and power plant site selection.

Water supply pipeline forest impact

About 1 percent (323 feet) of the supply pipeline would pass through wooded areas. Total impact to wooded land would be about 0.4 acres. These impacts would be associated primarily with stream crossings.

Water discharge pipeline forest impact

About 1 percent (522 feet) of the discharge Alternative Route 1 route passes through wooded areas. The total wooded area potentially affected would be about 0.6 acres. The impacts would be located primarily at stream crossings.

About 26 percent (1 mile) of discharge Alternative Route 2 passes through wooded areas. The total wooded area affected would be about 5.6 acres. The impacts would be primarily along STH 96 and at river crossings.

Endangered and Threatened species impact

A review of the Wisconsin Natural Heritage Inventory (NHI - a statewide database of known threatened, endangered, and special concerned species and communities) found no known occurrences of endangered and threatened species along any of the supply or discharge pipeline routes. Some endangered, threatened, and special concern species are found nearby; but little natural habitat remains because of the highly developed nature of the land along the pipeline routes. Impacts to endangered and threatened species are unlikely. Impacts to stream banks would be avoided by boring beneath stream beds.

Historic and Archeological Resources

An archeological review of the project area found no significant historic or archeological sites or resources. There is no guarantee, however, that during construction an archeological discovery would not be encountered. Discovery of any archeological items should be immediately reported and construction in that area should cease until an appropriate response from the WHS can be implemented.

Storm water management

Because more than five acres of land would be disturbed by this project, permits are required to control erosion and sediment from entering waters of the state. Pursuant to Department of Commerce and DNR (Wis. Admin. Code ch. NR 216) requirements, Fox Energy has developed and would be required to implement erosion control and long-term storm water management plans.

As part of the permit requirements, Fox Energy would have to undertake some hydrologic modeling to characterize existing runoff conditions and how the proposed construction would change runoff levels. As discussed in a previous section, the Freedom site drains through

culverts and ditches into tributaries of Apple Creek. Under existing conditions, total site surface water runoff is influenced by how much rain water can infiltrate the ground before it becomes surface runoff. Power plant buildings and associated structures create impervious surfaces where soil and vegetation once existed, preventing rain and surface runoff from infiltrating into the ground. Impervious surfaces such as concrete, packed gravel roads and fabricated buildings would increase surface water runoff from the site into the tributaries of Apple Creek without proper management.

In order to prevent the increase in volume and velocity of surface water from introducing more water and suspended solids, such as eroded soils, into the Apple Creek tributaries, the operational storm water management plan must include plans for the on-site management of water to slow down and detain surface runoff. Structures such as grass berms (filter strips) and storm water detention ponds allow suspended solids to settle out and govern the velocity and volume of the surface runoff. On a regional scale preventing "flash" or "peak" runoff events from sites such as the proposed power plant help to reduce overall runoff into surface waters in the area during periods of heavy rain or rapid snow melt.

Vegetation and wildlife

Existing

Based on available literature and field observations, the following types of vegetative communities and animals have been identified at the Freedom site.

Predominant vegetation types and communities

Vegetative communities at the site are agricultural row crops, mixed broad-leaved deciduous forest, and wetland vegetation.

About 97 percent of the project site is annually tilled for row crops, either soybeans or corn. Scattered throughout the field and around the periphery of these crop fields are weedy plant species such as annual ragweed *(Ambrosia artemisiifolia)*, nightflowering silene *(Silene noctiflora)*, Canadian thistle *(Cirsium arvense)*, and others.

Mixed broad-leaved deciduous woodland species occupy another two percent of the land area. These plants are found along the fencerow of the western boundary of the property and include silver maple *(Acer saccharinum)*, white oak *(Quercus bicolor)*, and others. Along more disturbed areas, species such as boxelder *(Acer negundo)*, staghorn sumac *(Rhus typhina)*, and others grow.

Wetland vegetation occupies the remaining one percent of the land area, and is found along the existing drainage routes (see Figure 3-2). The edges of these areas are occupied by nonnative species depending on the water gradients and degree of disturbance. In the drier locality of the wetland, common herbaceous species such as ragweed, Canadian thistle, and daisy fleabane (*Erigeron sp.*) are found, while along the interior of the ditches, the area is largely dominated by reed canary grass *(Phalaris arundinacea)* and other common annuals and perennials.

Predominant animal types and communities

No general wildlife surveys have been made at the site, but wildlife or their tracks have been identified in the wooded fencerow of the property, in the drainage ditches, and along the edges of the ditches. Small mammals such as eastern cottontail *(Sylvilagus floridanus)* and bird species including cedar waxwing (*Bombycilla cedrorum),* American robin (*Turdus migratorius)*, and mourning dove (*Zanaida macroura)* have been observed in the wooded fencerow. The drainage ditches provide cover for whitetail deer (*Odocoileus virginianus)*, raccoon (*Procyon lotor)*, red winged blackbird (*Agelaius phoeniceus),* and marsh wren *(Cistothorus palustris)*. Amphibians such as frog tadpoles and eastern American toads have been abundant along the pool margins.

Nuisance species

Since the site is primarily in row crops, the primary nuisance species are weedy species generally found in farm fields and fencerows. In the wetlands, reed canary grass predominates.

Threatened and endangered species

There have been no recorded occurrences of threatened, endangered or Wisconsin special concern species in the area. The U.S. Fish and Wildlife Service (USFWS) and the DNR's Bureau of Endangered Resources (BER) have confirmed this conclusion. No impacts to these types of resources are expected.

Construction impacts and mitigation

Construction activities like clearing, dredging, filling, and paving would remove agricultural crop land from production and realign drainage ditches and fencerows. Individual plants and animals and local populations of some species might be affected, but not the stability of any species as a whole in Wisconsin.

The DNR's storm water management permit would require use of proper erosion control methods during construction. This should prevent unnecessary erosion and the resulting deposits of soil and dust that could affect nearby waterways and their vegetation. Fox Energy has stated that it would take precautions to ensure that construction equipment used at the site does not bring in any nuisance plant species, such as purple loosestrife, that is not already present.

To mitigate the impact of the project, Fox Energy has stated its intention to retain a licensed landscape architect to develop a landscape plan that would include suggested plantings designed to soften the view of the facility and to improve wildlife habitat with native vegetation that provides wildlife cover and food.

Local Community

Site history

The Freedom site has been continuously farmed since about 1860. It has not been used for any other purposes during that time.

In 1949, 1960, and 1965, Michigan Wisconsin Pipeline Company was granted ROW to construct, maintain and operate a gas or oil pipeline. In 1965, Wisconsin Electric Power Company (WEPCO) was granted a utility easement to construct, maintain and operate two electric power lines on a portion of the site.

Several farm structures were added to parcels north of the site after 1973.

Land use

Existing land uses and zoning

The site consists of 55 acres of agriculturally zoned land (see Figure 3-5). In 2000, soybeans covered 35 acres of the land while 19 acres were in corn. Drainage ditches occupy the remaining one acre. Land uses surrounding the site are also predominantly agricultural, matching the zoning relatively closely (Figure 3-6). No recreational or publicly owned lands could be found within a half-mile of the proposed site. Half a mile to the east is the privately owned Fox Valley Golf Course.

Figure 3-5 Town of Freedom zoning classifications, adapted from the Outagamie County Zoning Atlas

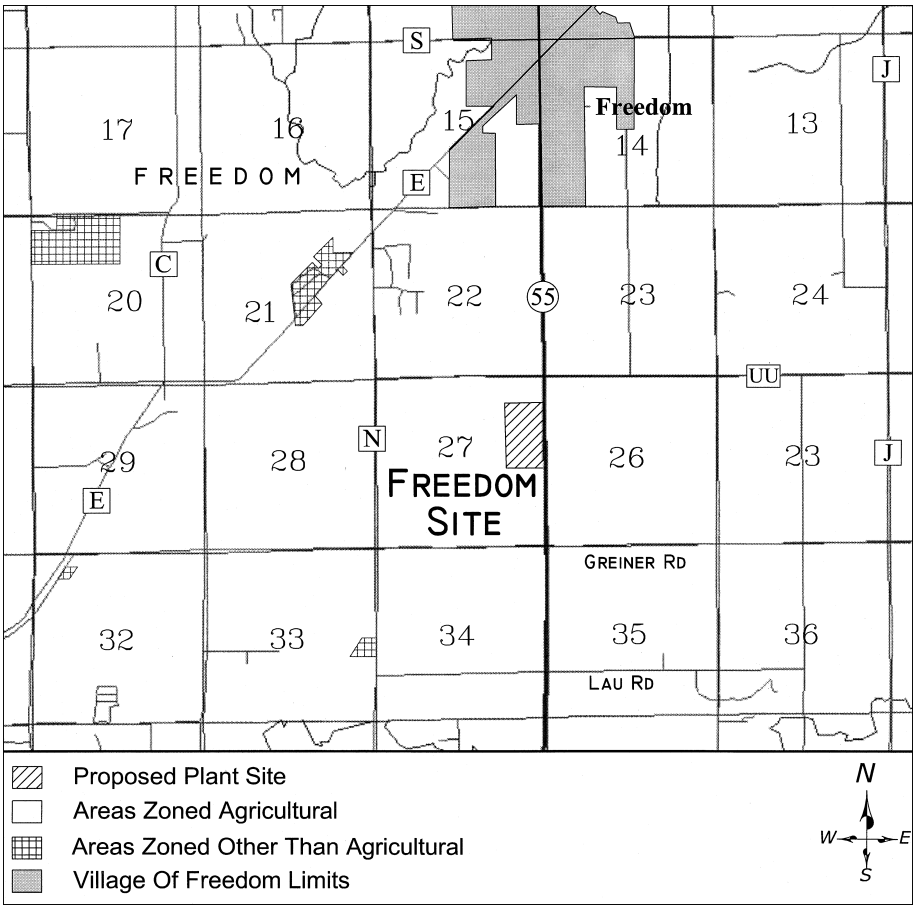
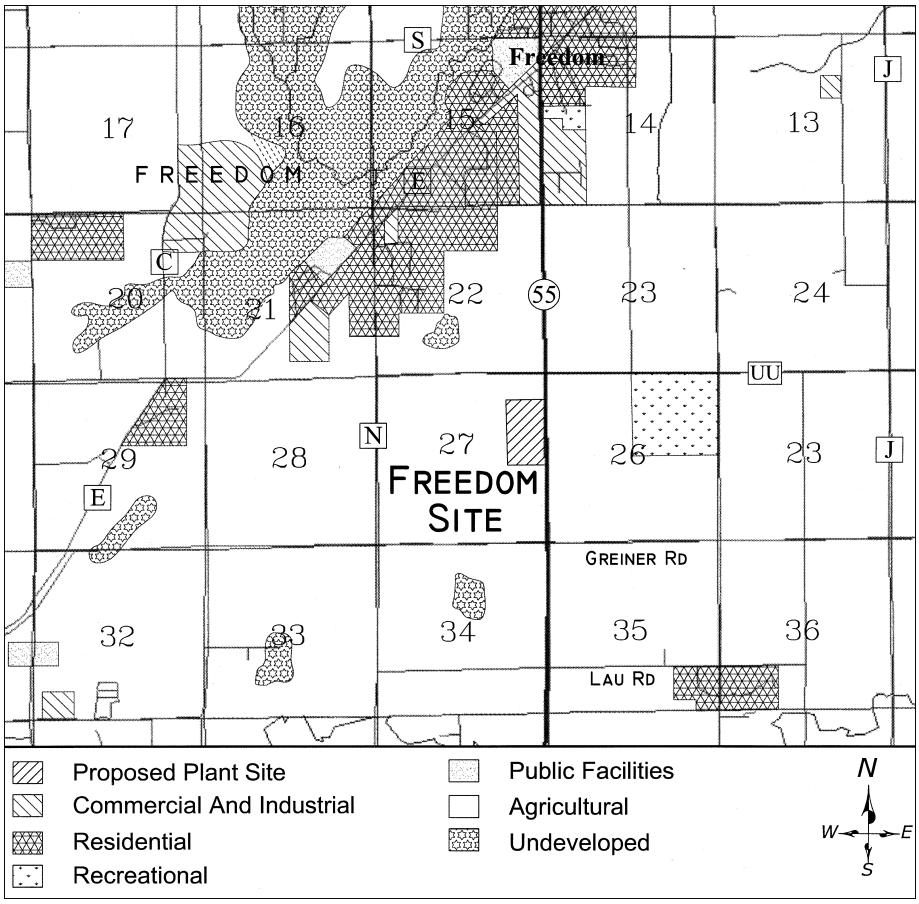


Figure 3-6 Town of Freedom land uses



The Outagamie County zoning ordinance governs the town of Freedom. The General Agricultural District as defined in the zoning ordinance prohibits construction of the proposed power plant at the Freedom site. Because the proposed plant would not be allowed under the ordinance, a petition was filed by Fox Energy to amend the zoning ordinance so a power plant of this nature along with associated interconnections may be built. The amendment to the zoning ordinance would be conditioned on the Commission's approval of the CPCN application for the plant. On January 24, 2001, the Freedom town board voted for the petition to rezone. The Outagamie County Zoning Administration reviewed the petition and forwarded its recommendations to the Outagamie County Planning and Zoning Committee. On February 13, 2001, this committee approved the amendment, but denied the rezoning. A campaign to reverse these results ensued. An issue of contention was that, if the land is rezoned industrial and the Freedom site were not selected by the Commission, then the Freedom site could be used by other industry. The county objected to this possibility. Consequently, Fox Energy filed a special use permit application that would allow construction of the power plant but restrict all industrial uses of the site if the Commission did not select the Freedom site. On March 27 and 28, 2001, the town of Freedom Planning Commission and the Freedom Town Board respectively voted to

grant a special use permit. However, on April 24, 2001, the Outagamie County Planning and Zoning Committee voted to deny a special use permit. Thus, the site remains zoned for agricultural use only.

Changes to land use from construction or operation

Upon completion of construction, the project would occupy approximately 28 acres, including about 30 parking spaces for employees and visitors. The remaining 27 acres would be seeded or planted to restore grasses, forbs, and woody plants native to the area.

Compatibility with local land use plan

The Outagamie County Development Plan and the Town of Freedom Land Use and Development Plan encourage industrial development south of the existing industrial park near the village of Freedom (see Figure 3-6). The proposed site has excellent highway access and is located 1.3 miles south of the industrial park. Although the power plant would certainly be a new, large feature on the local landscape, it would appear not to conflict with adjacent land uses.

Local community services

Water or wastewater utility

The HOV treatment plant is expected to provide the water needed by the project except for potable water, which would be provided by an on-site low-capacity well or an existing municipal supply. HOV is capable of providing 5.3 MGD during the summer peak hours or 4.24 MGD on the average. No local community water service is needed. The wastewater from the plant would be discharged into the Fox River with no municipal services involved. Fox Energy would construct and operate both the raw water supply and wastewater receiving systems for the project.

Refuse collection service

Fox Energy would privately contract for solid refuse disposal. No municipal services would be required.

Police

During both the construction and operation of the plant, the town of Freedom Police Department would provide law enforcement services to the facility. Law enforcement services are also provided by the Outagamie County Sheriff Department. These services are provided through local tax revenue. No extra budget needs are expected.

Fire protection

The Freedom Volunteer Fire Department would provide the facility with fire protection and rescue services during the construction and operation of the plant. There would be no additional cost to any town of Freedom residents or business.

Emergency medical services

The Freedom First Responders, a volunteer organization, would provide emergency care as needed during the construction and operation of the plant. There would be no additional costs resulting from the project except an ambulance fee and equipment that is financed through the town of Freedom local taxes.

Schools

Plant construction and operation would not be expected to increase the population significantly. No impacts to kindergarten through twelfth grade enrollment would be anticipated.

Roads and railroads

Existing

There are several major roads and highways near the Freedom site (see Figure 3-1). USH 41, STH 55, CTH UU, and Greiner Road would be the main roads used for the project. CTH UU and STH 55 would form the eastern and northern boundary for the site. USH 41, a major four-lane, limited access highway, is about four miles from the site.

Required additions or surface changes

The applicant would build one access road approximately 500 feet long from the plant to CTH UU. No additional roads or surface changes to existing roads are required for the construction or operation of the plant.

Impact during construction and operation

Both CTH UU and STH 55, the two roads forming boundaries of the site, and other roads in the vicinity of the site are currently not heavily traveled roads and could handle the additional traffic flow of approximately 400 additional workers' cars during plant construction. Data gathered by the Wisconsin DOT shows that the intersection of CTH UU and STH 55 has an average annual day count of 3,200 vehicles for two-way traffic. The intersection of STH 55 and Greiner Road, located just southeast of the site, yields an average annual day count of 4,000 vehicles. These roads could handle the extra vehicles during construction, and the impact on traffic would be light.

Permits would need to be obtained from the appropriate state agencies to transport heavy loads that require heavy-load multiple-wheel truck trailers. Transport of heavy or oversized loads would take place during off-peak traffic hours.

During the operation of the plant, the facility would employ approximately 24 permanent employees. Twenty employees would work during the day shift, and four would be on the night and weekend shift. Overall, the impact on local traffic would probably be imperceptible during the operation of the plant.

Fogging and icing

Potential for plume development

When a power plant is running, the cooling tower dissipates waste heat from the heated water of the steam turbine. It also discharges water vapor into the atmosphere. When heat from a power plant is released to the atmosphere through the cooling towers, a water vapor plume that has length, breadth, density and direction is formed. The characteristics of the plume depend on weather conditions and the design of the cooling tower. A visible plume is considered a negative visual impact, and can affect driving conditions. A plume touching the ground results in fog, and when the temperature is below freezing, the fog changes to ice on road surfaces.

Potential for fogging or icing

To quantify the potential for local fogging and icing from the cooling tower water vapor discharges, Fox Energy used the Electric Power Research Institute's Seasonal Annual Cooling Tower Plume Impact (SACTI) computer model to predict how many hours per year the plume from the proposed plant would create fogging or icing conditions on the surrounding area.

The result of the modeling shows that between 2.5 and 16 hours per year of fogging is possible within approximately 3,000 feet from the cooling tower. As the contours in the diagram in Figure 3-7 show, the number of potential hours of fogging along a distance of approximately 1,300 feet of the nearby highway (STH 55) would range between 2.5 and 4.5 hours per year.

The model also predicts the possibility of ice formation within 2,300 feet of the proposed cooling tower. As shown in Figure 3-8, ice formation potential would range between 15 minutes and 5.5 hours per year along a stretch of approximately 3,000 feet of STH 55.

While the annual number of hours of fogging and icing along STH 55 is small for a well-traveled two-lane highway with a speed limit of 55 miles per hour, any fogging or icing could cause a real traffic hazard during those brief times.

One possible way to reduce fogging and icing, thus reducing the possibility of an accident, would be to consider using a different cooling design. A wet/dry tower or an all-dry cooling system have the capability to reduce or eliminate plume formation, and thus reduce fogging and icing, by increasing the amount of dry air released and decreasing the amount of humid air. Fox Energy has not proposed either of those designs.

The cooling tower design would incorporate "maximum drift eliminators" that would substantially minimize the fogging and icing potential from the plant. In addition, caution signs should be placed to advise motorists of any possible icing hazard along nearby roads.

Figure 3-7 Map showing areas and numbers of hours of predicted fogging from the proposed power plant at the Freedom site

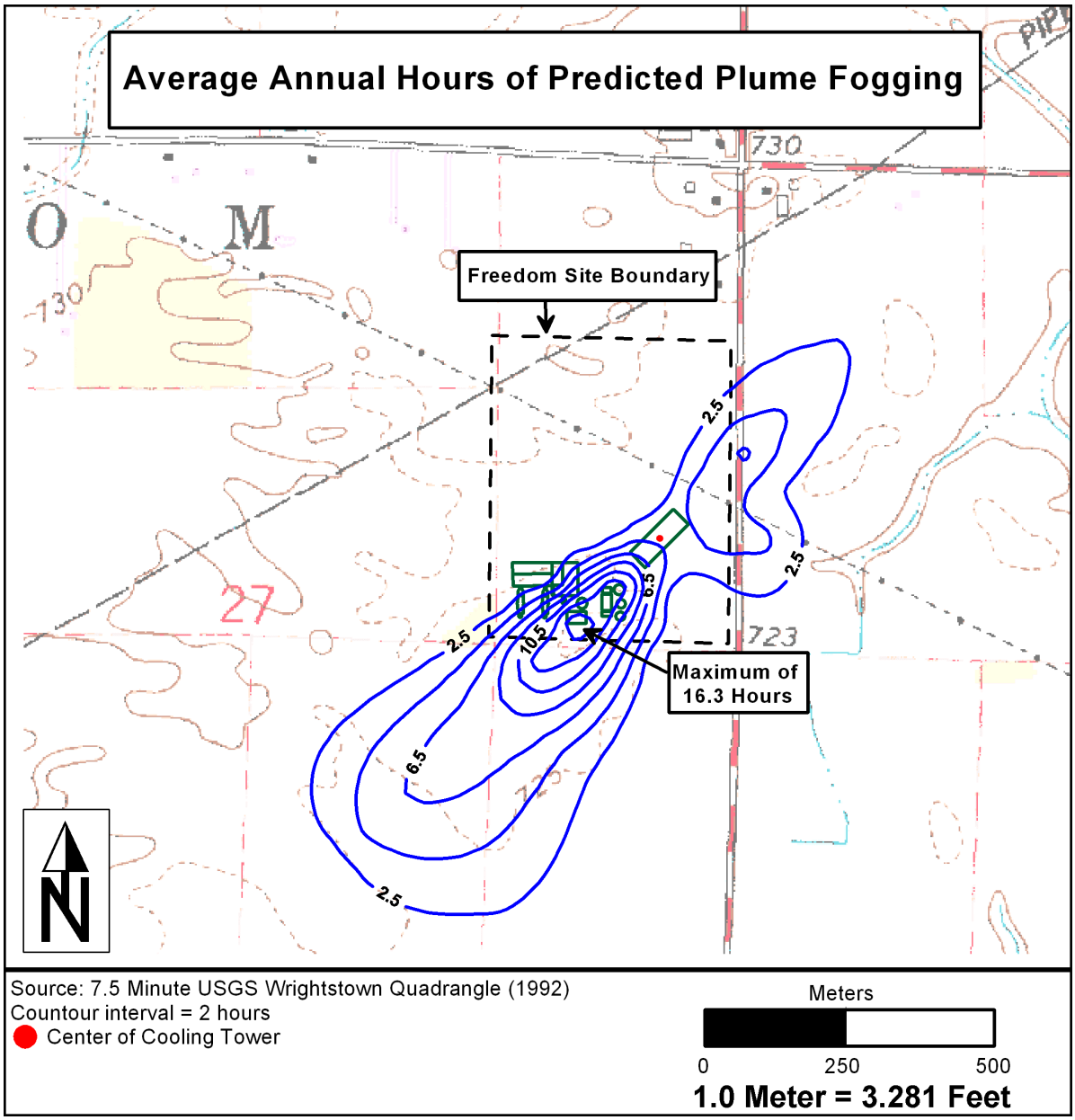
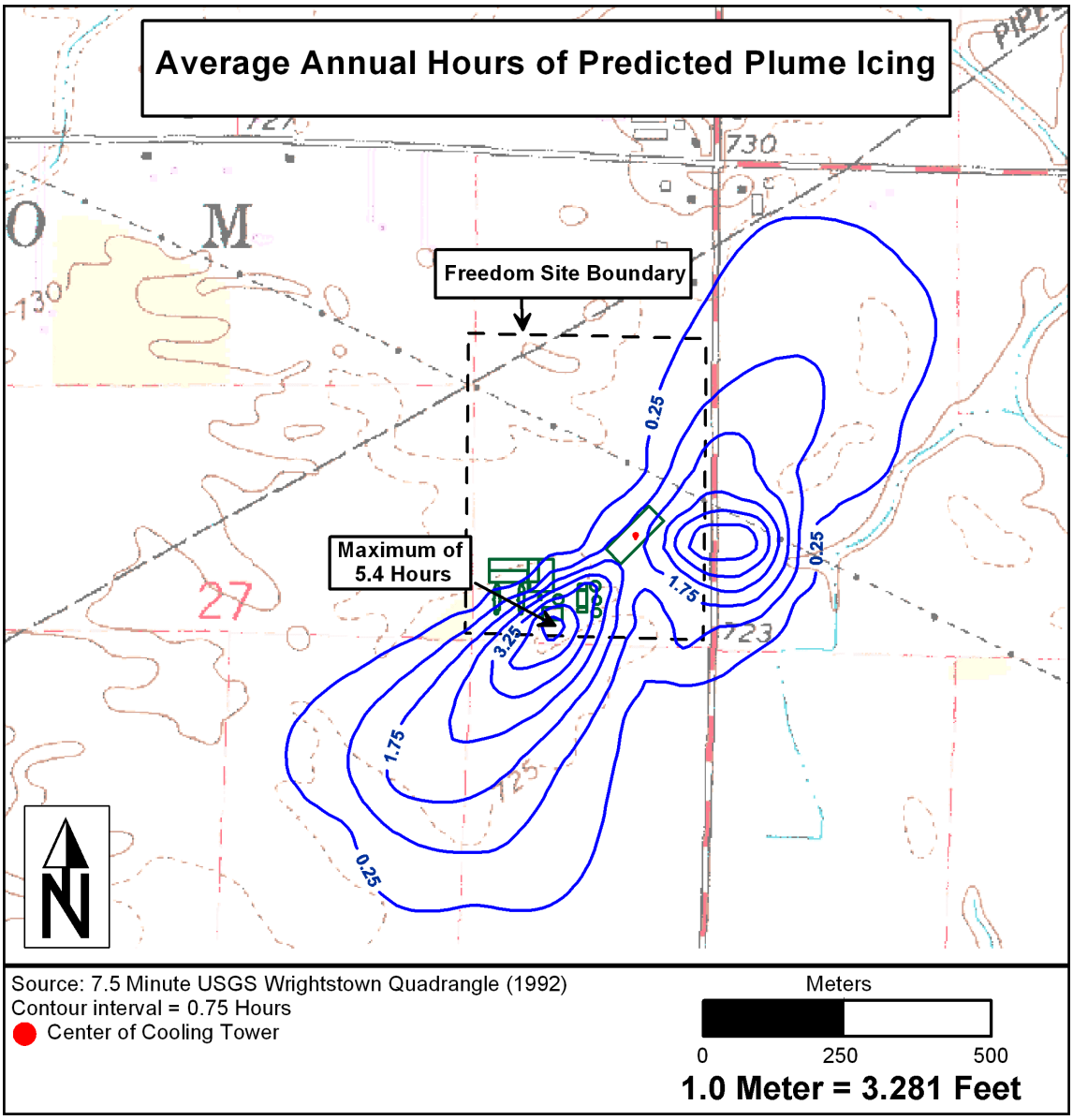


Figure 3-8 Map showing areas and numbers of hours of predicted icing from the proposed power plant at the Freedom site



Noise

Applicable local noise ordinances

There are no local, county, or state noise regulations identified for the proposed Freedom project site. There is, however, a local noise ordinance. Section 17.53 (5) of the Outagamie Zoning Code is intended to keep noise-sensitive development, such as schools and homes, from occurring within a certain area affected by noise from USH 41. In the absence of applicable noise regulations, the applicant evaluated its proposed facility's noise emissions against the existing acoustic environment and the EPA guideline day-night sound level (L_{dn}).

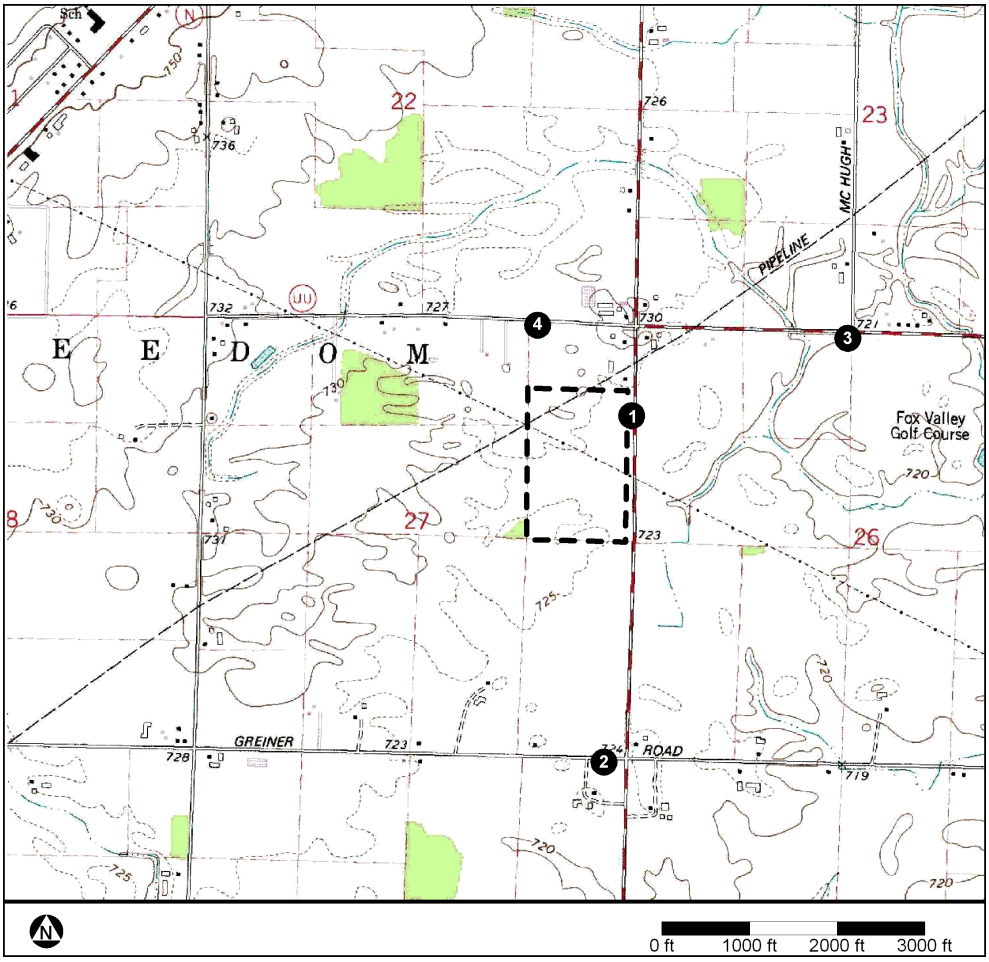
Design criteria

The noise design criteria for the proposed Freedom facility were proposed using two different sound measurements; "A-weighted" and "C-weighted" sounds. Sound energy is characterized by amplitude and frequency. Amplitude is measured in decibels (dB) and frequency is measured in hertz (Hz). The A-weighting (dBA) scale simulates the frequency response of the human ear to sounds typical of the surrounding environment. The human ear can hear frequencies ranging from 20 Hz to 20,000 Hz and is typically most sensitive to sounds in the middle frequencies. The A-weighted scale emphasizes this middle range and de-emphasizes sounds in the high and low frequencies. The C-weighted (dBC) scale is used to measure a phenomenon known as "infrasound vibration." This infrasound vibration is an exertion of high magnitude, low frequency noise on wood framed walls and windows that can cause a perceptible vibration. For the proposed project, the company used values of 48 dBA and 70 dBC, obtained using the EPA guidelines, as noise compatibility thresholds for the surrounding environment.

Existing environment

There are potential receptor sites and residences located in all directions from the proposed Freedom site. Fox Energy conducted a noise evaluation on September 5-7, 2000, to gather ambient noise data from four discrete locations surrounding the proposed project area. The sound monitoring locations were as follows: 1) east boundary of site, located approximately 25 feet from STH 55; 2) south of the site, near the intersection of STH 55 and Greiner Road (chosen to represent the nearest residences south of the proposed site); 3) northeast of the site near the intersection of CTH UU and McHugh Road (chosen to represent residences northeast of the site); and 4) north of the site near the intersection of STH 55 and CTH UU (chosen to represent the residences north of the site). Figure 3-9 shows the locations of the four receptor sites used in the noise evaluation.

Figure 3-9 **Locations of the four measuring points, or receptor sites, used in Fox Energy's noise evaluation**



The company used sound data from these four locations to quantify existing acoustic conditions, to predict facility noise emissions, and to assess what mitigation measures, if any, would be needed to insulate surrounding receptors from noise levels above the EPA guidelines (48 dBA and 70 dBC). The data indicated that the Freedom region was typical of a rural environment influenced by transportation and rail corridors. Ambient noise sources in the area were identified as local traffic and natural noises such as crickets.

Sound levels in the surrounding environment were examined using two different sound references. The equivalent-continuous sound level, L_{eq}, and the exceedance sound level, L_x, were used to illustrate the level of noise at and around the four receptor sites. The L_{eq} is used to represent the reference, or background sound over a given sample period. For example, $L_{eq(1h)}$ provides an indication of the average sound level, in dBA, over a one hour sample period. The L_x is a statistical sound level where the sound level is exceeded "x" percent of the sampling period. While the L_{eq} can be considered an average sound energy level, the four values used for

L_x represent the sound levels exceeded 1, 10, 50, and 90 percent of the sampling time. The L_1 level is essentially the peak or the sound from the loudest events. The L_{10} level is used by the Federal Highway Administration to assess the need for traffic noise mitigation as high values of L_{10} indicate vehicle traffic as the dominant source. The L_{50} level is the level where half of the time the noise is louder or quieter. The L_{90} level is typically used to classify residual noise environments as it measures background sound without the influence of loud, transient noise sources such as a passing vehicle or overhead aircraft. Sounds in the area would exceed the L_{90} level 90 percent of the time.

Continuous noise monitoring was conducted by the company at each of the four locations for a 24-hour period. The 24-hour average L_{90} level for Measuring Point 1 (see Figure 3-10) has been estimated to be about 47 dBA. For noise Measuring Point 2 it has been estimated to be approximately 43 dBA. At Measuring Point 3, the noise estimate was approximately 43 dBA. The 24-hour L_{90} noise measurement at Measuring Point 4 was estimated to be approximately 51 dBA. According to levels associated with common noise sources, these measured noise levels are moderate; comparable to the noise of soft stereo music playing in a residence or common office activities. Levels approaching 60 dBA and above would be comparable to near highway traffic (road and rail traffic above 55 dBA tends to annoy most people). Table 3-9 illustrates the continuous 24-hour noise measurements for all four measurement locations and compares them to the background, L_{eq}, environment at each location.

Table 3-9 Continuous (24-hour) ambient sound level measurement results, dBA

Measuring Point		L_{eq}[10]	L_1	L_{10}	L_{50}	L_{90}
1	Minimum	48.0	65.0	45.5	40.0	37.0
	Maximum	67.0	80.5	71.0	63.0	56.0
	Average	56.1	74.5	63.6	52.5	46.6
2	Minimum	40.5	58.0	44.5	38.5	36.0
	Maximum	59.0	75.0	63.5	55.0	49.0
	Average	50.0	67.6	57.4	48.2	43.0
3	Minimum	41.5	52.0	40.0	37.0	35.0
	Maximum	59.0	71.5	61.0	55.5	52.5
	Average	54.0	65.9	53.2	46.3	42.6
4	Minimum	45.0	61.5	53.5	49.5	48.5
	Maximum	59.5	74.0	63.5	58.0	57.0
	Average	53.8	68.9	58.2	53.3	51.4

The average L_{10} values at the Freedom site are greater than the average L_{90} values. The average L_{10} values for three of the four receptor sites exceed 55 dBA. These noise levels indicate that road or rail traffic is the most likely cause of these higher sound averages.

[10] Due to equipment problems, the L_{eq} measurements at Locations 1, 2 and 4 are averages of the number of measurements taken rather than 24-hour averages.

In addition to the continuous-type monitoring, short-term noise measurements (10-minute duration) were randomly taken during the same three-day test period to illustrate ambient noise during morning, midday and night. Table 3-10 illustrates the measured values and average values from each of the four monitoring sites. As discussed previously, the 24-hour measurements were conducted to characterize typical daytime and nighttime ambient noise conditions around the proposed Freedom site. The short-term measurements were taken in 10-minute increments during different periods of the day and night to capture intermittent noises in the existing acoustical environment. In other words, these intermittent measurements were taken to illustrate the amount that transient noises such as a passing vehicle, overhead aircraft or working farm equipment exceed the existing background sound level environment.

Table 3-10 Short-term (10-minute) ambient sound level measurement results, dBA

Time of Day	Measuring Point 1				Measuring Point 2				Measuring Point 3				Measuring Point 4			
	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}
Morning	51.7	38.7	35.3	55.7	39.2	35.4	34.2	37.3	39.4	37.2	35.1	37.4	46.0	40.5	38.2	44.6
Midday	72.1	56.8	47.3	67.7	58.4	52.5	49.3	56.4	57.6	48.3	45.7	57.3	56.0	51.9	50.8	59.7
Night	72.3	59.1	51.5	67.3	58.4	52.0	48.5	55.4	62.1	53.5	49.8	59.1	NM[11]	NM	NM	NM
Average	65.4	51.5	44.7	63.6	52.0	46.6	44.0	49.7	53.0	46.3	43.5	51.3	51.0	46.2	44.5	52.2

Table 3-10 illustrates that mornings appear to be quieter overall in this area than middays or even nighttimes.

Construction noise impacts

The resulting construction noise to build the proposed Freedom plant would consist mostly of a series of intermittent sources, most of which would originate from the diesel engine drive systems that power most construction equipment. It is likely that during peak construction, construction work may occur for 10 to 16 hours per day. Typical construction noises, as modeled for a similar power plant project in southeastern Wisconsin, are illustrated in Table 3-11[12]

[11] No measurement (NM) taken due to near-by lawn mowing equipment.

[12] Taken from the final EIS for Badger Generating Company, LLC, PSC Docket # 9340-CE-100.

Table 3-11 Estimated maximum noise levels for typical construction equipment (dBA)

Construction Equipment	Maximum Noise Level (dBA) Typical Range at 50 Feet
Steam blow off (4-8-inch line)	124-134
Air blow off (4-8-inch line)	120-130
Blasting	93-94
Dozer (250-700 hp)	85-90
Front end loader (6-15 yard^3)	86-90
Trucks (200-400 hp)	84-87
Grader (13-16' blade)	83-86
Shovels (2-5 yard^3)	82-86
Portable generators (950-200 kW)	81-87
Derrick crane (11-20 T)	82-83
Mobile cranes (11-20 T)	82-83
Concrete pumps (3-150 yard^3)	78-84
Tractor (3/4-2 yard^3)	77-82
Unquieted paving breaker	75-85
Quieted paving breaker	69-77

Operational noise impacts

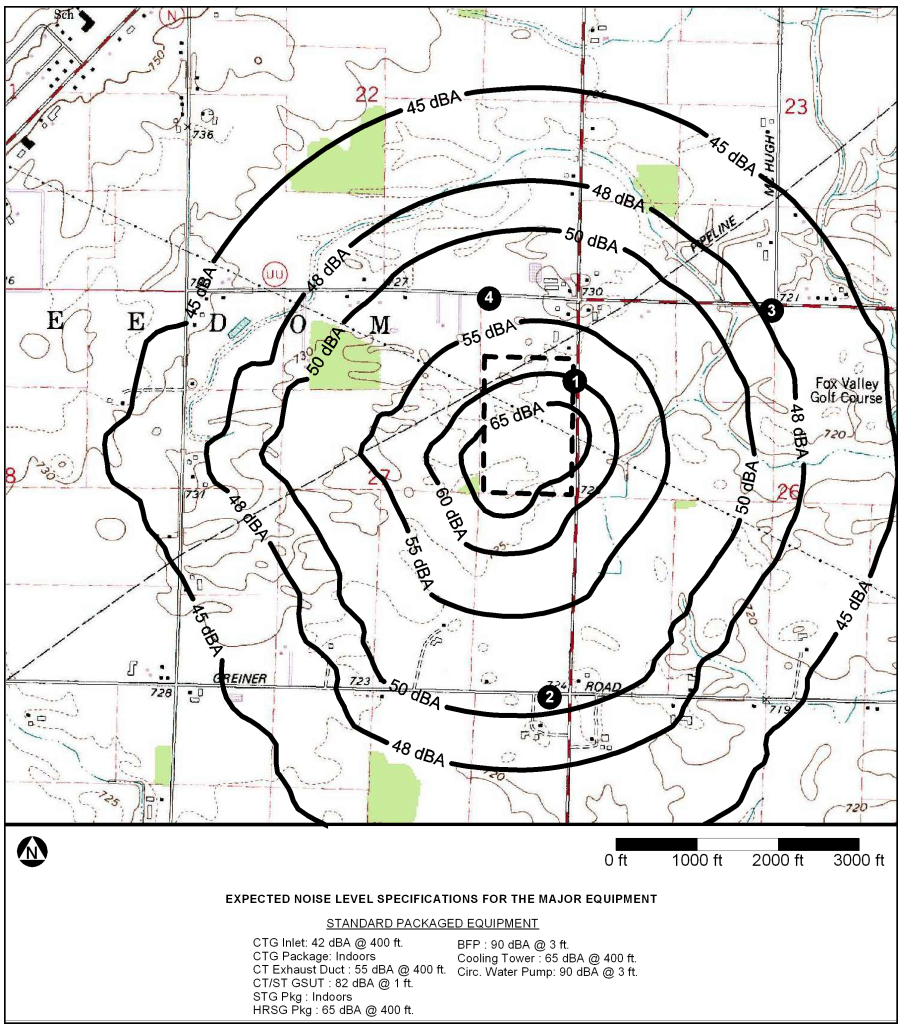
Audible noise

While construction noise would be emitted during the development of the site and erection of the plant, operational noise would be emitted throughout the life of the plant. Major noise sources introduced by the proposed project would include noises from CT generator packages, heat recovery steam generators, steam turbine generator packages, generator step-up transformers and cooling towers. Audible operational noise levels from the plant should be maintained at a low level compared to the existing ambient levels so that the overall increase in noise is minimal. The proposed Freedom facility noise emissions were initially modeled based on standard packaged generating equipment fitted with "stock" noise mitigation equipment. Fox Energy would have to base its final plant and equipment designs on this modeling as the stock noise mitigation equipment is not designed with a particular site in mind and may or may not conform to the existing acoustical guidelines. Table 3-12 lists the standard packaged equipment and its associated noise emissions. Figure 3-10 illustrates the predicted noise emissions at the local receptor sites using contours for visualization.

Table 3-12 Anticipated equipment sound level specifications for standard packaged equipment

Equipment	Noise Source Components	Sound Level Specification
CTG package	Turbine compartment, generator compartment, ventilation fans, exhaust ductwork and all other auxiliary equipment.	Indoor
CT inlet	CT air inlet.	42 dBA @ 400 ft
CT vents	CT vent fans, blowers, ductwork and associated components located or discharging outdoors.	50 dBA @ 400 ft
HRSG package	Transition ductwork, boiler, stack, stack exit, and all other auxiliary equipment included in the scope-of-supply.	65 dBA @ 400 ft
Steam turbine generator package	Compartments, ventilation fans, piping, and all other auxiliary equipment included in the STG scope-of-supply.	Indoor
Boiler feed pumps	Pump and motor assembly.	90 dBA @ 3 ft
Generator step-up transformers	Transformer with fans at max cooling.	82 dBA @ 3 ft
Cooling towers (12-cell)	Fans, motors, gearboxes, water splash, and all associated equipment.	65 dBA @ 400 ft
Building	Insulated metal panel system. (22 ga outer liner, 4-inch insulation, 20 ga inner liner)	STC-40 (minimum)
Building louvers	Total max louver area = 5% of total wall area.	Standard Louver
Building ventilation	Power roof ventilators (x total).	83 dBA @ 3 ft
Fuel gas metering station	Pumps, compressors, valves, piping, and all associated equipment.	50 dBA @ 400 ft

Figure 3-10 Predicted noise levels in dBA at local receptor sites around the Freedom power plant site



Effect of the design goal

According to the standard packaged equipment noise data and the noise emission modeling results, some sound levels were measured at or above the EPA guideline level of 48 dBA. Additionally, the sound levels are above the typical background sound levels at most locations surrounding the proposed Freedom site. The facility sound levels would need to be reduced or mitigated to achieve consistency with the existing acoustic environment.

By upgrading the noise mitigation equipment beyond the standard packaged equipment, Fox Energy could possibly achieve consistency with the existing acoustic environment. However, further noise emission modeling using equipment upgrades apparently shows that the upgraded equipment alone does not appear to solve all of the noise emission exceedance levels. Receptor sites 1 (60 dBA) and 4 (54 dBA) would still be exposed to potential noise emissions over the EPA guideline (48 dBA) for the background environment. Further mitigation measures would

have to be evaluated for these areas. Measures that could be taken include noise attenuation equipment on the cooling towers and the erection of barrier walls to the north of the plant. Landscaping techniques could also mitigate noise emissions. Fox Energy has committed to incorporate landscaping and native tree species to mitigate the noise impacts.

It appears from the modeling results that equipment upgrades would sufficiently mitigate noise emissions at Receptor Sites 2 (48 dBA) and 3 (45 dBA). At these locations, the proposed facility noise emissions are consistent with the existing ambient noise environment.

Low frequency noise

Low frequency noise and vibration have been identified in some Wisconsin CT plants. It is felt as a vibration or rattling of structures and is not clearly identifiable when measuring or estimating sound using the A-weighted decibel scale.[13] Sound pressure[14] levels must be measured or determined across the full range of sound frequencies. Airborne sound waves in the frequency range below 40 Hz, if high enough in magnitude, can couple with building frame walls and windows and cause vibration.

The vibration problem occurs with simple-cycle CT plants, but generally not with combined-cycle plants. The CT plants discharge their exhaust gases directly to the atmosphere through exhaust silencers, which do not silence well below 40 Hz. Most large CTs create very high levels of acoustic energy below 40 Hz, and this energy can radiate as airborne waves and easily propagate over large distances. In combined-cycle plants, such as the proposed Freedom facility, the turbine exhaust gases are directed through a heat exchanger system and HRSG rather than to the atmosphere directly through an exhaust silencer. The exhaust gases lose energy in the boiler tubes. Low frequency exhaust noise is reduced to very low levels, and vibration problems do not appear. For this project, even when the plant is only in the CT mode, the exhaust gases would go to the heat exchanger system.

The company provided measurements and estimates for this project using the C-weighted scale, which more easily enables identification of low frequency noise. Table 3-13 shows a comparison of existing C-weighted noise versus the projected C-weighted noise emissions with the aforementioned upgraded equipment.

As discussed previously, the US EPA Guideline calls for a C-weighted sound level of 70 dBC or less as an acceptable sound level within residential locations. According to Table 3-13, the modeling results indicate the proposed facility noise emissions would be at or below the 70 dBC at all but one of the receptor sites.

[13] When noise measurements are taken, it is customary to use A-weighting of the sound meter to approximate the sensitivity of the human ear across the frequency range of human hearing. Because its response curve is clearer in the lower frequencies, C-weighting of the sound meter can give a better indication of the potential for low-frequency vibration.

[14] Sound pressure level measurements are only made with a sound level meter that does not compensate for the sensitivity of the human ear across the frequency range of human hearing. Such devices are said to have a "flat" frequency response.

Table 3-13 Comparison of existing C-weighted background sound levels and projected C-weighted facility noise emissions with upgraded silencing equipment

Receptor Sites	Representative Measurement Location	Range of Measured C-Weighted Background L_{90} Sound Level, dBC	Predicted C-Weighted Facility Sound Level, dBC
East site boundary (no residence)	1	48.7 – 52.1 dBC	71 dBC
South of site	2	47.5 – 51.3 dBC	60 dBC
Northeast of site	3	48.4 – 54.5 dBC	58 dBC
North of site	4	49.0 – 51.8 dBC	64 dBC

Prominent tones

Some power plants in Wisconsin have exhibited problems with certain frequencies of sound (tones) carrying farther from the plant and creating impacts. Usually, these problems have been associated with large fans that are used in coal-fired plants. Even though many pieces of the combined-cycle plant equipment would be potential tonal noise sources, the broadband sources (towers, turbines, and generators) would be much more prominent and would mask them within 1,000 feet.

Visual landscape

Existing visual landscape

In this region of Wisconsin, farmland is contiguous across much of the rural landscape. The roadways surrounding the Freedom site consist of county roads and state highways. Several farmsteads and residences are proximal to the proposed power plant site to the north, south, east and west. There is no visible commercial or industrial development in the immediate area surrounding the site with the exception of a golf/country club to the east along CTH UU. The surrounding area is predominantly agricultural and residential and the landscape is generally flat with small clusters of woods interspersed with farm fields. People can see for long distances.

From STH 55, the entire Freedom facility would likely be visible and would probably be highly visible from CTH UU, CTH N and Greiner Road. Depending on the final height of the plant stacks, they would probably be visible from most vantage points in the immediate and surrounding area. It is difficult to judge how big the plant and its facilities would appear after completion, but it is reasonable to assume that it would be a dominant and unique feature on the landscape. The proposed power plant buildings would give a strong visual impression of modern industry. However, the existing farm field on the proposed site and the surrounding farmsteads give a strong visual impression of rural Wisconsin. The only visual indications of industry are the 345 kV and 138 kV transmission lines that run through the site and an ANR natural gas metering station north of the site at the southwest corner of STH 55 and CTH UU. Figure 3-11 shows a power plant rendering, as it would be viewed, looking west-northwest from STH 55. Figure 3-12 shows this view from a closer vantage point with its current land use and the two transmission lines traversing the site.

The locations from which the proposed plant would be most visible would probably be:

1. Farmsteads and several residences north of the proposed site (both on the adjacent properties and along CTH UU).
2. Farmsteads along STH 55 to the northeast and southeast of the site.
3. Farmsteads and residences to the west of the proposed site (along CTH N).
4. Residences and farmsteads to the south of the proposed site along Greiner Road.

Figures 3-13, 3-14, 3-15, and 3-16 show views looking towards and across the proposed site. Using the pictures listed above and comparing them to Figure 3-11, one might visualize how the plant may appear on the landscape from all directions.

Changes in views and impacts of construction and operation

Changes in views

The current views, from various vantage points around the proposed site, include farm fields, some small patches of woods northwest of the site, farmsteads and residences north, south, east, and west of the site, and existing 345 kV and 138 kV transmission lines that are oriented northwest-to-southeast across the proposed site. The various power plant structures, including buildings, exhaust stacks, cooling towers, water storage towers and a substation, range in height from 25 feet to a maximum of 185 feet (the exhaust stacks). As it is proposed, the power plant would be oriented such that the generators, buildings and cooling towers would be situated along the southern property boundary of the proposed site along STH 55. The property line is approximately 50 feet west of the road, and it is likely that any structures would be no more than 1,000 feet from the road. All facilities would be to the southwest of the existing 345 kV and 138 kV lines. The plant access road would traverse the site and tie into CTH UU to the north.

Figure 3-11 **Image of the proposed plant at the Freedom site by Fox Energy, looking at the plant to the northwest from STH 55. The covered water supply reservoir along STH 55 is not shown.**

Figure 3-12 View of proposed Freedom site to the west from STH 55

Figure 3-13 View of Freedom site to the north from Greiner Road

Figure 3-14 View of Freedom site to the southwest from STH 55 near CTH UU

Figure 3-15 View of Freedom site to the east, in distance, from CTH N

Figure 3-16 View of southern portion of Freedom site, due west, from STH 55

Views from CTH 55, Greiner Road, CTH UU, and CTH N would likely include views of most of the plant and its facilities depending on vantage point. The current view of the site from any direction includes farm fields, a large stand of trees, 345 kV and 138 kV transmission lines, and several farmsteads and residences. The heights of many of the power plant structures would dwarf the crops and small trees that currently exist on and adjacent to the site. The current land use on the site blends with the surroundings. The present landscape does not support tall enough vegetation to obscure the view of the plant except for those residences situated inside a wooded area northwest of the site. Local residences would likely have a clearer view of the plant when the foliage is absent.

Given the relatively flat topography of the immediate area, one can stand on the site and look at a far-reaching horizon of farmsteads and silos. It is reasonable to assume that the proposed power plant could be seen from a great distance.

Construction impacts

From a visual perspective, the construction of the proposed plant could appear chaotic or interesting, depending on the viewer's frame of mind. It could also appear out of place, given the bucolic setting of the existing farms, fields and woods.

Impacts of operation

The proposed plant would change the view of people living in or working around the houses nearest to the site. These people would no longer see just the 345 kV and 138 kV transmission lines, but rather would see a commercial-looking building with industrial looking facilities.

Although the buildings would be colored and built to blend with the surrounding landscape, there are few features on the existing landscape that have any similarities to the proposed plant.

The actual views seen by people in the general vicinity of the houses and farmsteads would vary depending on the location of windows, the screening provided by yard trees and bushes, the habits of individuals, and the direction in which people are looking. Generally, people living near or driving past the site could see an industrial feature rather than open countryside when looking toward the site from STH 55, CTHs UU and N, and Greiner Road. There are no other structures, natural or manufactured, that are tall enough to screen out the proposed exhaust stacks, cooling towers and substation facilities.

Mitigation methods

There is probably no way to mitigate the visibility of the plant. However, the final appearance and overall aesthetic effect of the proposed plant could be altered by a number of details, such as bush and tree plantings, fences, berms, paint colors, and lighting. The success of this type of mitigation depends on the final design. Fox Energy has committed to a landscape plan that maintains naturally appearing features as much as possible.

Lighting

Fox Energy would light the plant site in a manner similar to other industrial sites. Lighting may also increase at special times during construction or operation (for construction at night or during special plant maintenance). Overall, the level of light would increase near the site. However, according to the Outagamie County zoning ordinance, Section 17.50 (2)(b), "the plant shall not produce any intense glare or lighting with the source directly visible beyond the Industrial District boundaries." Directional lighting would be used for lighting necessary to provide a safe working environment. The lighting would be designed so that the lighting would not shine directly onto adjacent properties. Fox Energy would decide on the lighting requirements during the final project design phase. The FAA may also require lighting on the plant stacks. The lighting on the stacks would create a new visual effect in the surrounding areas. There are no other tall, lighted features at this time on the surrounding landscape.

Lighting would be provided for all structures and equipment operating areas. The illumination levels would be in accordance with the latest edition of the Illuminating Engineering Society (IES) Handbook for power generating facilities. Typically, the outdoor operating areas would be provided with approximately 5-foot candles average and roadway lighting would be 0.5 foot-candle average. Exterior areas would utilize enclosed and gasketed high-pressure sodium fixtures suitable for the environment. All fixtures would be provided with prismatic or flat glass refractors to provide maximum luminance control in a downward direction. All fixtures would be rigidly supported from structures or from galvanized steel poles. Typical street lighting would be from 150-watt high-pressure sodium roadway luminaries installed on 35-foot poles with six-foot bracket arms. Structure and equipment operating areas would generally be lighted from 100-watt high-pressure sodium luminaries. Outdoor structure lighting for operating areas, such as the transformer areas, would be controlled from a photoelectric controller and contactor that includes a hand-off-auto switch for manual control capabilities.

Historical and archeological sites

Known and listed historic properties

Under Wis. Stat. § 44.40, the Commission must determine if project construction and operation could affect historic properties listed with the WHS. The listings at the WHS show no traditional cultural, archeological, or historic architectural properties at the power plant site that would be affected by the construction and operation of the proposed power plant.

Compliance with the National Historic Preservation Act

Because there are federal permits and approvals required for the plant, the more stringent federal requirements of Section 106 of the National Historic Preservation Act (NHPA) would supersede those of Wis. Stat. § 44.40. Section 106 applies to all construction aspects necessary for the power plant project. Enforcement is through the federal permits and approvals. Requirements could include field surveys and other investigations to locate and determine the significance of any historic, archeological, or cultural resources in the project area and a requirement to enter into a memorandum of agreement with interested parties about how these resources are to be treated.

Potential impacts

It is always possible that undiscovered artifacts or archeological sites might be found during construction. If such finds were made, they would need to be reported to the WHS at once. If human remains were discovered at any time during the project construction, construction would stop and Fox Energy would need to contact the WHS immediately for compliance with Wis. Stat. § 157.70, which provides for the protection of burial sites.

Sensitive or vulnerable communities

There are about 20 residences, one publicly owned building, and no known daycare or eldercare facilities within one-half mile of the site. The nearest elementary school is about 1.3 miles northwest of the site. The nearest community hospital is about 5.7 miles to the southeast. Construction and operation of the plant would not be expected to have an adverse impact on these places or the people who use them. Potential impacts from air emissions, visual landscape changes, traffic changes, or noise are discussed elsewhere in this chapter.

Local economics

Shared revenue

Under current Wisconsin gross receipts tax law, a merchant plant such as the Fox Energy facility would be assessed an annual gross revenue license fee in lieu of local property taxes.

Under current Wisconsin revenue sharing law, an estimated $750,000 per year would be distributed by the state to Outagamie County, and $375,000 per year would be distributed to the town of Freedom.

Jobs and other economic benefits

During the peak construction period, the project would be expected to generate 400 to 500 jobs, approximately $50 million in local expenditures, and a payroll of approximately $27 million.

Once in operation, the plant would have approximately 24 full-time employees, mostly residents of the local community. Fox Energy states that those who were hired from outside the community would be expected to relocate and become residents of the community.

Fox Energy has stated its intention to be an active member of the local community, participating in charitable and community service organizations.

Development impacts

No secondary development would be expected to occur if the power plant is built. Natural gas is already available in the area. The new natural gas and water pipelines to the proposed plant would not be designed to serve any other customers. The electric transmission line connected to the proposed power plant would not serve other customers, and the power that the plant produced would be sold wholesale through the transmission system. Fox Energy has stated it has no intention of selling steam.

Planned public outreach activities

Public information meetings

Fox Energy stated its intention to continue to maintain contact with the community to keep it informed of the project status. On August 9, 2000, Fox Energy held a public information meeting in the Freedom Town Hall. The meeting was advertised in three editions of the Appleton Post-Crescent newspaper prior to the meeting. Invitations to the meeting were also sent to neighbors within one half mile of the site. PSC and DNR staff attended the meeting. On November 14, the company conducted another public information meeting, shortly after completing and submitting the air permit and CPCN applications. The same persons were notified about the second meeting, which also was used by Fox Energy to announce its proposed electric transmission and water pipeline routes to the Fox River. Its May 23, 2001, meeting involved landowners along the entire Fox River water pipeline route.

If the plant were approved at the Freedom site, Fox Energy's stated intention would be to hold a groundbreaking ceremony that would be open to the public and well publicized. In addition, local media would be able to take periodic tours of the facility as construction progressed.

ATC, which became an applicant in March 2001, held a public meeting about the electric transmission position of the project on June 14, 2001.

Opportunities for public input

In its newspaper advertisements, letters to the neighbors and information packets, Fox Energy provided a telephone number and an opportunity for the public to call the company for

questions regarding the project. This avenue of contact could be maintained available in the future as well.

Natural Gas System

Description of existing natural gas system and proposed facilities

ANR owns three gas transmission lines, two 8-inch pipes and one 16-inch pipe, that pass through the proposed project site. Maximum allowable operating pressure (MAOP) of these lines is 975 pounds per square inch gauge (psig). A metering station and pipeline taps would be installed to connect the proposed power plant to the existing ANR gas transmission lines.

The new gas supply line would run entirely within the power plant property boundaries. The pipeline tap and metering station on ANR's pipeline would also be onsite. The proposed power plant facility would require the construction of approximately 1,200 feet of 12-inch diameter gas service line. MAOP of the new service line would be 975 psig. The gas service line would be constructed using standard construction practices and would be in compliance with all applicable state and federal codes. Details about the construction methods are in Chapter 2.

Environmental factors

Since the pipeline would be installed entirely within the power plant property boundaries, the impacts of trenching and installation of the line would be part of the overall impacts of site construction. Soil erosion control would be necessary to avoid movement of soil off site in the air as dust or into the jurisdictional wetlands in the site property that are discussed earlier in this chapter. Construction equipment noise would be the same as, and integrated with, that for the plant itself.

4

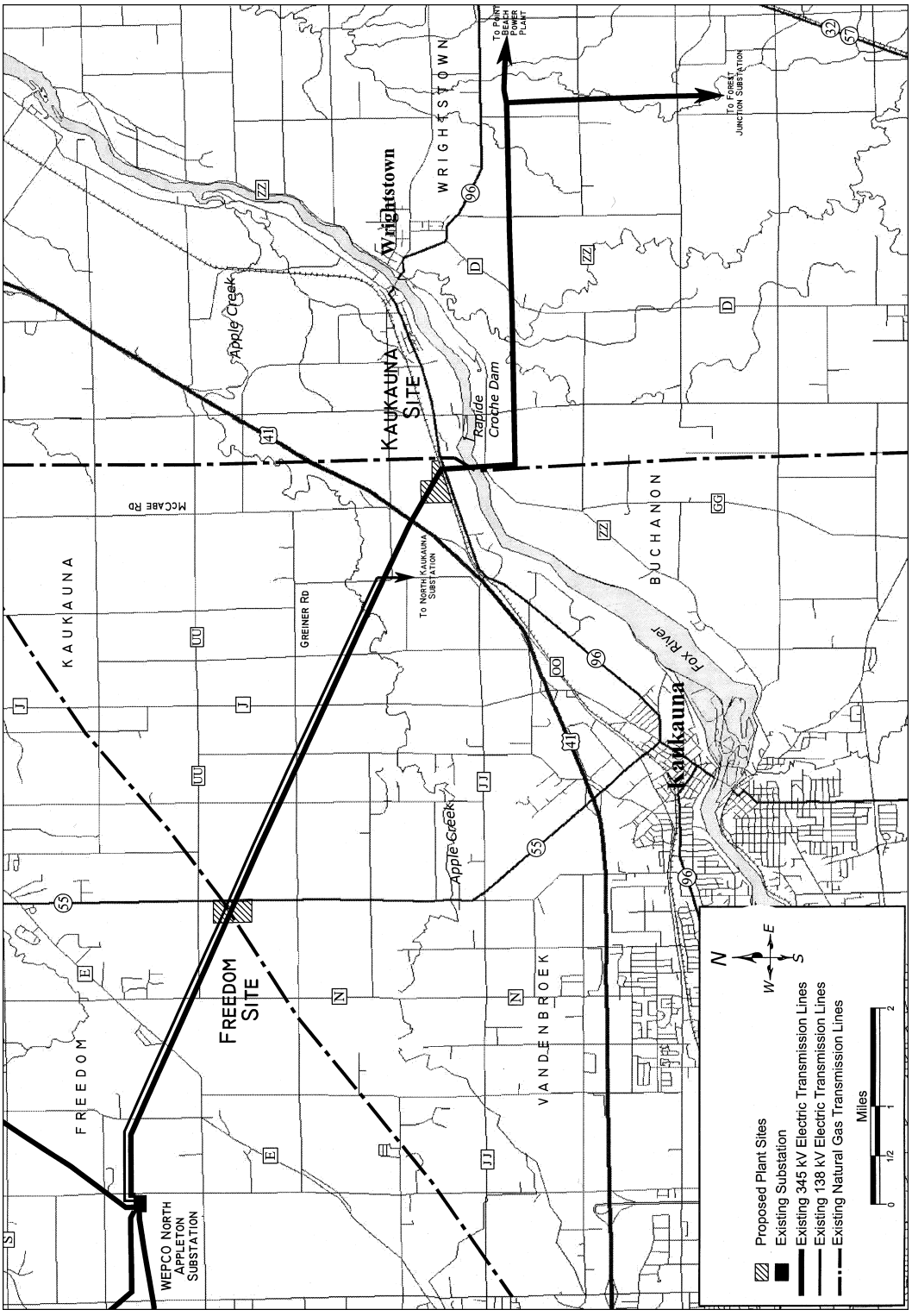
Chapter 4 – Environmental Review—Kaukauna Power Plant Site

Site Description

The Kaukauna project site is located in the town of Kaukauna in Outagamie County, in the western portion of Section 4, Township 21 North, Range 19 East. The site consists of one 54-acre parcel, owned by Lloyd Bowers and a five-acre parcel owned by Peter Bowers. It is zoned industrial and agricultural. Currently, the land is used to grow corn. Fox Energy has an option to purchase the land. Upon completion of the project, the plant would occupy approximately 27 acres of the 54-acre site.

The site is located approximately two miles west of the village of Wrightstown, a community of approximately 1,250 people (see Figure 4-1). STH 96 and the WCL Railroad form the southern boundary of the site while USH 41 passes 100 feet to the west and northwest of the site. Although the immediate vicinity of the site is primarily agricultural, the Wrightstown Industrial Park and a residential development called River Bend Estates lie approximately one mile northeast and southeast of the site respectively. In addition, a new golf course, approximately 250 new homes, and the village of Wrightstown's municipal well are less than a mile away from the site. The site is also approximately 2.5 miles east of the city of Kaukauna. The city of Kaukauna is one of the Fox Cities. The Fox Cities are a rapidly growing group of contiguous municipalities with a combined population of approximately 200,000. The larger Appleton-Oshkosh-Neenah metropolitan statistical area, of which the Fox Cities are a part, has a population of approximately 345,000.

Figure 4-1 **Locations of Freedom and Kaukauna power plant sites and existing electric and natural gas transmission facilities**



Natural Resources

Air

Source description

Fox Energy has submitted an air pollution control permit application to construct and operate the proposed combined-cycle generating station at this site. The application is similar to that filed for the proposed plant at the Freedom site. Refer to Chapter 3 for a discussion of potential air quality impacts at the Freedom site.

As at the Freedom site, emissions from the proposed project at the Kaukauna site would be produced by the following individual sources:

- Two CT generators/heat recovery steam generators (CT/HRSGs) firing natural gas (includes duct burners).
- One diesel-fired emergency shutdown generator.
- One diesel-fired emergency fire pump.
- One auxiliary boiler.

Applicable air quality standards

As discussed in Chapter 3, the Clean Air Act requires the EPA to establish NAAQS for air pollutants that could have an impact on human health or welfare. The EPA describes an area as nonattainment if the ambient air quality standard for one or more criteria air pollutants is not met. The Kaukauna site area, like the Freedom site area, is in attainment of the primary and secondary NAAQS for all the criteria pollutants: SO_2, NO_x, CO, PM_{10}, ozone, and lead. The same emission sources are subject to BACT review and to NSPS. Acid rain and visibility requirements, as at the Freedom site, would probably not be difficult to meet. HAPs must again be considered.

Expected project air pollutant emissions

Hourly emissions

The estimated maximum hourly emissions from the CT/HRSGs, as well as those from the emergency shutdown diesel generator, emergency diesel fire pump, and natural gas-fired auxiliary boiler, are identical to those discussed and tabulated in Chapter 3 for the proposed plant at the Freedom site (see Table 3-1).

Startup and shutdown emissions

As at the Freedom site, the two CTs at the Kaukauna site would be started and shut down periodically depending upon load requirements, maintenance and operating schedules. Fox Energy's startup and shutdown emissions estimates would be the same at the Kaukauna site as those tabulated and discussed in Chapter 3 for the Freedom site (see Table 3-2).

Annual emissions

Table 3-3 in Chapter 3 summarizes the potential annual air pollutant emissions expected from the proposed power plant, regardless of which site is selected, and Chapter 3 discusses how those emission levels have been estimated.

Table 3-3 and the discussion in Chapter 3 show that the proposed plant has the potential to emit more than 100 tpy of at least one regulated pollutant. This makes it a major new stationary source under the PSD program. Annual emissions are compared with the PSD threshold emission limits in Table 3-4. The estimated emissions of NO_x, CO, PM/PM_{10}, VOCs, and SO_2 exceed the established PSD significance levels. As a result, these pollutants are subject to PSD review and Ambient Air Quality Impact analyses and corresponding BACT analyses, just as they are at the Freedom site.

Air quality impact analysis

The DNR performed an air quality review for the Kaukauna site as required by Wis. Admin. Code ch. NR 405. The results are identical to those modeled for the Freedom site.

A PSD increment baseline has been established to set the amount of criteria pollutants that Fox Energy may emit before the local atmosphere has no more capacity to accept them without impact to human health.

The modeling analysis predicts that the impact of the proposed Fox Energy power plant would not exceed the "monitoring deminimis" level for any pollutants. The results of the increment analysis are identical to those illustrated in Table 3-5. The proposed turbines are modeled along with the auxiliary boiler, emergency generator, and the fire pump engine to determine the area of significant impact for the criteria pollutants. Concentrations of SO_2, NO_x, and PM_{10} are above significant impact levels for all averaging periods, but an analysis of the increment consumed shows that the plant would meet the PSD increments for all the pollutants.

The maximum concentration impacts of all air emission sources are the same as those identified for the Freedom site and listed in Tables 3-5 and 3-6. Tables 3-5 and 3-6 show that the proposed power plant project in the town of Kaukauna would not consume PSD increments and would meet and comply with all the applicable NAAQS. The projections for the plant also would satisfy Wisconsin's ambient air quality standards for ammonia (Table 3-7).

BACT analysis

The BACT proposals that are discussed in Chapter 3 for the Freedom site apply also here for the Kaukauna site.

Other applicable air quality standards and programs - conclusions

New Source Performance Standards

As at the Freedom site, it appears that the plant's CTs and the auxiliary boiler would be in compliance.

Acid Rain Program

Fox Energy states that, given the relatively insignificant number of SO_2 allowances required for operation of the proposed plant with natural gas, there would be sufficient allowances available on the open market at a reasonable cost to allow the plant to remain in compliance with the Acid Rain requirements.

Visibility

As at the Freedom site, the proposed plant at the Kaukauna site would be a new air pollution source, but there are no PSD Class I areas within 100 kilometers (about 65 miles) of either site according to the DNR. Therefore, any potential visibility impacts from the proposed power plant on Class I areas would be negligible.

Hazardous air pollutants

HAP requirements and Wisconsin's program to regulate the emissions of air toxics are identical to those discussed in Chapter 3 for the Freedom site. Because the proposed plant would combust only Group 1 virgin fossil fuels (natural gas and No. 2 fuel oil), the combustion processes are exempt from the requirements of Wis. Admin. Code ch. NR 445. However, the 10 ppmvd ammonia slip emission expected from the SCR system is regulated. The total ammonia emissions from the two CT/HRSG units are anticipated to be 67.76 lb/hr and 593,578 lb/year.

Table 3-8 and its related discussion show the potential for HAP emissions from the proposed power plant, regardless of site. The potential is the same for a plant at either site.

Permit status

The DNR Air Pollution Control Construction Permit and Operating Permit (Numbers 00-RV-169 and 00-RV-169-OP) have been drafted, and the required public comment period has been held. On that basis, it is likely the permit will be issued as proposed.

Geology

The Kaukauna site is located in an area of thick glacial deposits. These unconsolidated surficial deposits are underlain by sedimentary bedrock of the Cambrian and Ordovician periods. Depth to bedrock is a minimum of 50 feet. High-capacity wells in this region pump groundwater from aquifers within the bedrock. The Cambrian-Ordovician aquifer system contains the major water bearing units in the vicinity of the proposed project site. Construction reports for area wells show depth to bedrock near the site to be approximately 50 to 100 feet.

Impacts after construction

Construction of a power plant would not affect the area's geology. There would be no high-capacity well at the proposed site.

Topography

The proposed Kaukauna site is generally flat with a gentle slope from southwest to northeast. The site and its surrounding area slope toward tributaries to Apple Creek. The approximate elevation of the Kaukauna site is 670 feet.

Impacts after construction

Construction of a power plant would change the topography slightly. The ground would be made more level to build and further manage run-off water. Because the site is nearly flat, the potential for erosion due to construction activities is low. Further, the facility would have to follow a DNR-issued storm water management plan that meets local and state standards.

Soils

The Kaukauna site is covered by three different soil series: the Schiocton, Manistee, and Winneconne series. In basic terms, a soil series is a grouping of soils developed from the same parent material and formed under the same processes. Soils within the same series have similar physical, chemical, and morphological characteristics. Most soils in Outagamie County were derived from either material deposited by the glaciers or material deposited as lacustrine (of or relating to lakes) sediment.

The Kaukauna site is predominantly covered by the Schiocton series. Soils in this series consist of deep, somewhat poorly drained soils. These soils are primarily of silt loam, very fine sandy loam, stratified silt and very fine sand. Schiocton soils have a severe rating for shallow excavating and frost action; wetness and floods are considerations when building structures without basements, such as the proposed generating facility. Also found on the site, in smaller distributions, are the Manistee and Winneconne soil series. The Manistee series consists of very deep, well-drained soils and are made of loamy fine sands, sand, clay and silty clay. These soils are rated severe for dwellings without basements due to low strength and shrink-swell characteristics. The Winneconne series consists of deep, moderately well drained and well-drained soils and are comprised of silty clay loam, clay and silty clay. These soils have the same limitations as the Manistee series. According to the Soil Survey of Outagamie County, Wisconsin, all three soil series have moderate to high erodibility factors and the soils should not be left exposed after construction of the plant and surrounding landscape are completed.

Impacts during and after construction

The soils on which Fox Energy would build could complicate construction because of individual soil property limitations. Construction would remove, compact, and mix soil profile layers. Any heavy equipment operated during wet periods on the poorly drained soils would damage their structure. Construction and landscaping efforts should avoid compaction that would reduce soil percolation and avoid causing erosion of soil that would fill site drainage ditches. Poorly drained soils have required tile drainage for crops.

Outagamie County was entirely forested before European settlement took place. In the northern portion of the county, the forest composition was mixed conifer-northern hardwood forest. Central hardwood forest covered the southern part of the county. The Fox Energy plant and surrounding facilities would remove some acreage from production of native vegetation or row crops. Productive soils removed for construction of buildings, substations or access roads could be retained on site and used to revegetate the resulting landscape with native plantings. It is unlikely that planting crops would be a practical use of the land, but planting native hardwoods such as sugar maple, red maple, northern red oak, beech or basswood would restore some of the natural vegetation once native to the site. Additionally, directly east of the Kaukauna site footprint, a native stand of trees exists. The plantings could help soften the industrial character of the site by screening buildings, abating noise and returning some natural character to the landscape.

Water resources

Watershed and floodplain

The Kaukauna site is located in the Fox River watershed, approximately 0.25 mile north of the river. The current drainage pattern runs from the southwest corner to the northeast corner, which prevents direct site runoff from entering the Fox River. The site drains to the northeast through drainage tile into two unnamed tributaries of the South Branch of Apple Creek. These tributaries continue to the north and east into Brown County where they join the main branch of Apple Creek at the intersection of USH 41 and CTH U. Apple Creek continues east to its confluence with the Fox River, approximately 1.7 miles north, northeast of Wrightstown. There is some site drainage directly to the Fox River from the southwest portion of the site, traveling under STH 96 through a culvert. According to the Outagamie and Brown County Flood Insurance Rate Maps, the proposed Kaukauna site lies outside of the Fox River and Apple Creek floodplain boundaries

Wetlands

Fox Energy conducted a wetland identification and delineation survey in July 2000 to determine the number, size and location of any jurisdictional wetlands on the proposed Kaukauna site. Although some areas were identified as having hydric (wet or water-holding) conditions, these areas were associated with agricultural drainages, and no wetlands were found on this site. According to the DNR Wisconsin Wetlands Inventory maps, no federal or state jurisdictional wetlands are present on the proposed site. Additionally, no protected resource waters have been identified on the site or identified as having the potential to be impacted by site operations.

Groundwater

Significant adverse impacts to groundwater are not anticipated for this proposed project. No high-capacity well is proposed for this site. The raw water supply for the power plant operation would be taken by pipeline from the HOV. A shallow, 100 to 200 foot, on-site well would be drilled for use as a potable water supply for domestic uses such as drinking water, showers, toilets and sinks. The well would use approximately 1 to 20 gpm.

Heart of the Valley (HOV) - the water source for steam production and for cooling

The HOV, under an agreement with Fox Energy, would provide the raw water supply. HOV treats wastewater from several Fox Valley municipalities. Municipal water in the area comes primarily from groundwater sources. HOV operates under a WPDES permit that sets limits on the concentrations of conventional and toxic pollutants it may discharge to the Fox River.

Fox River - description of discharge environment

The environment in the Fox River at the point of discharge is discussed in detail in the corresponding section of Chapter 3. The point of discharge into the Fox River is the same for both sites.

Fox River - potential impacts of Fox Energy water discharge

The potential impacts of the Fox Energy water discharge on the Fox River is discussed in the corresponding section of Chapter 3. The impacts would be the same whether the Kaukauna site or the Freedom site were selected.

Water supply and discharge pipeline routes and construction

The proposed power plant would require two water pipelines: one for the supply water from HOV and one to discharge water into the Fox River. (See Chapter 2 for a detailed discussion of pipeline construction, water needs, uses, treatment, and storage.) Water would be delivered to the Kaukauna site through a buried 22-inch diameter HDPE pipeline, and discharge water would be carried to the Fox River by way of a six-inch diameter HDPE pipeline.

Pipeline ROW

Fox Energy proposes to locate the water supply pipeline primarily within existing road ROW. As a merchant plant, Fox Energy is, by DOT policy, prohibited from placing facilities inside the public ROW of state highways. Without an exemption from state and federal highway authorities, the pipeline would need to be located just outside the road ROW, entirely on private land. The proposed water discharge pipeline would be relatively short (about 2,000 feet) and would be built on a cross country route along an existing electric transmission line. The amount of private land needed for permanent and temporary construction easements would vary depending on whether the pipeline could be placed within the road ROW and the actual width of the road ROW. Combined, the permanent and temporary easement needs on private land would vary between 35 and 50 feet wide. Permanent easements could vary from 21 to 35 feet wide (see Chapter 2 for a detailed discussion of pipeline ROW requirements).

Pipeline environmental impact in general

Large pipelines result in linear corridors that can result in significant environmental impacts. In this case, all the proposed water pipeline routes follow primarily along existing road or transmission line ROW. In addition, the landscape has been significantly altered from its pre-settlement condition and is dominated by agricultural, residential, and commercial development. While there are a number of environmental concerns associated with the pipelines, most of the impacts would be short term and could readily be managed and mitigated with proper planning and by use of techniques designed to minimize environmental impacts. For any pipeline approved in this project, landowners could seek protection against construction impacts and

possible future impacts by placing requirements for post-construction land treatment and remedies for accident and future repair activities in each easement contract. Construction requirements and methods for the water pipelines are discussed in detail in Chapter 2. A more detailed discussion of potential general water pipeline impacts can be found in the corresponding section of Chapter 3.

Pipeline routes

Water supply pipeline route

For the Kaukauna site, only one water pipeline route has been proposed. The pipeline would exit HOV heading north to Augustine Road. To do this, the pipeline would pass under the Fox River lock system just north of HOV. This would be accomplished by directional boring, an activity that requires a permit from the ACOE. As for the Freedom site, the permit was issued on January 22, 2002. The pipeline would then follow the south side of Augustine Road heading east to Plank Road. It would then turn north and follow the east side of Plank Road for about 500 feet until it reaches the 138 kV high-voltage transmission line corridor. At this point the pipeline would follow the transmission corridor to STH 96. The pipeline would then follow the north side of STH 96 for approximately 2.75 miles before entering the Kaukauna site at the existing 345 kV transmission line corridor (see Figure 4-2).

Discharge water pipeline route

Only one discharge pipeline route has been proposed for this site. The discharge water pipeline would exit the site where the existing 345 kV line leaves the property. The discharge pipeline would follow the transmission line corridor south for about 1,500 feet to the Fox River.

Pipeline agricultural impact

In general, pipeline impacts can affect farming operations during construction and can affect the land's ability to produce crops in the future if improper construction methods are used. Impacts can include crop loss from construction activities and loss of soil fertility through soil compaction or improper management of top soil. Because top soil would be separated from subsoil and returned to the surface after the trench is backfilled, loss of soil fertility is unlikely. The effects of soil compaction from heavy equipment could be reduced or eliminated with proper post construction soil treatment. The entire easement width could be cultivated using chisel plows and repeated disking. There appear to be no buried irrigation systems along the pipeline routes. In the event of any damage to existing irrigation tile, Fox Energy says it would promptly repair and restore damaged tile to its original or better condition. Because farming practices are generally allowed to continue after a pipeline is compete, it is unlikely that any long-term agricultural impacts would result. Possible impacts could result in future years should the pipeline break or need repair.

Supply water pipeline

Figure 4-2 shows the location of the supply pipeline.

About 48 percent (1.9 miles) of this route passes through agricultural land. Combining both the temporary and permanent easement requirements, the pipeline construction could affect a maximum of about 11 acres of farmland. Because construction is planned for summer, it is possible that some crops may be lost. Companies building pipelines generally compensate land

owners for the value of crops lost or damaged during construction. Compensation is agreed upon during easement negotiations. Since all construction would be conducted along roadways, the overall agricultural impact is likely to be small and temporary. If tillable fields were affected, generally normal row crop farming practices could be resumed after the pipeline is completed and the soil is conditioned to eliminate compaction problems. Long-term impacts are not expected.

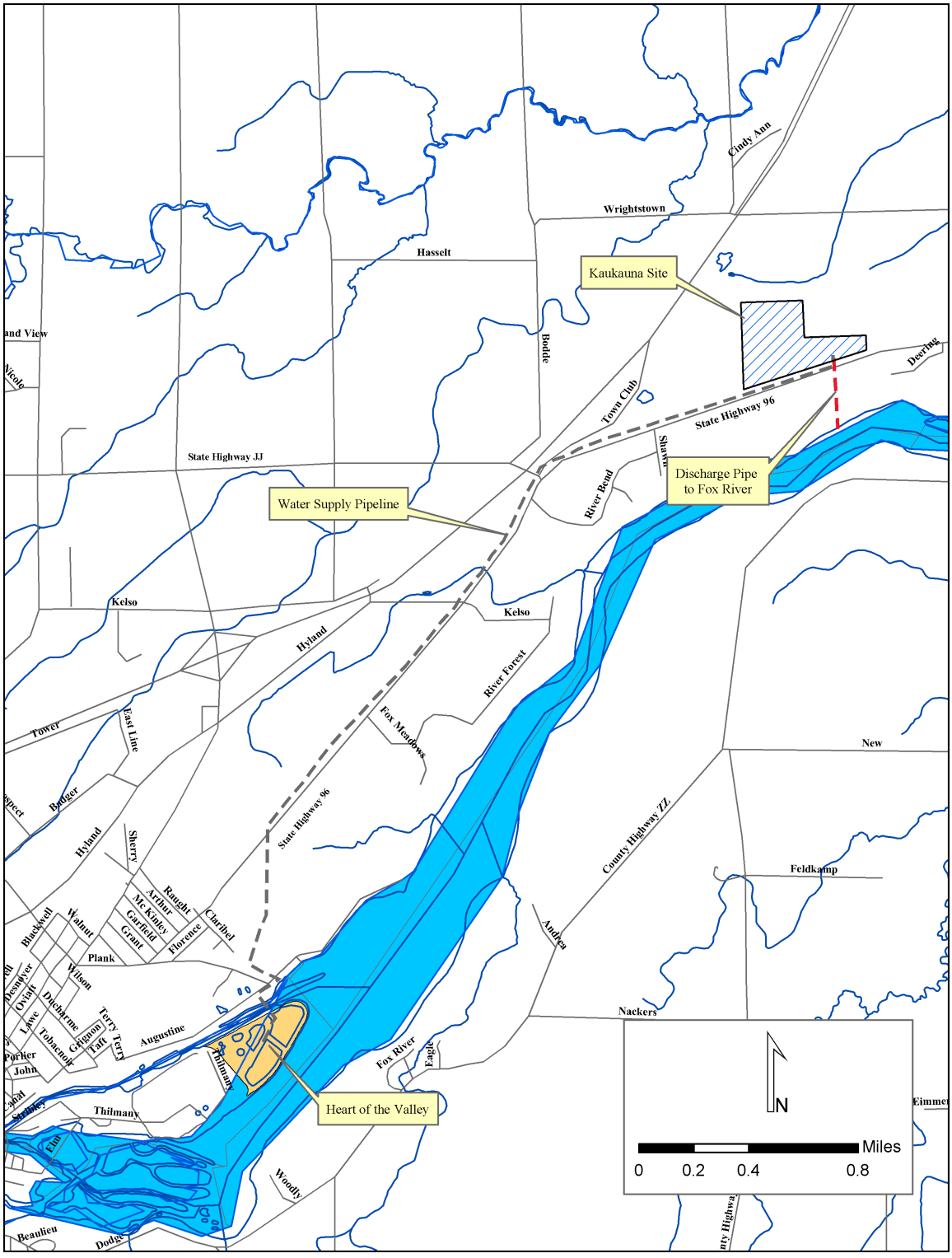
Discharge water pipeline

About 70 percent (1,390 feet) of discharge pipeline passes through agricultural lands. The combined impact from temporary and permanent easements would be about 1.6 acres. As proposed, the pipeline would share most of its ROW with an existing 345 kV transmission line. Potential impacts would be the same as those discussed previously.

Pipeline residential impact

Short-term impacts could include limited access to property during construction, dust, temporary loss of vegetation, and noise. Long-term impacts could occur because permanent easement lands must be cleared of large trees. Fox Energy has committed to returning the land (including driveways) to its original or better condition at the end of construction. Long-term impacts would also include restrictions on land use that would be described in easement agreements. Typically, these restrictions prohibit the construction of buildings and limit the types of plantings on easement lands. Fox Energy has committed to work with landowners to return their personal landscape to an acceptable condition. This would include the use of landscaping plantings. Residential impacts could also be managed by choosing project sites that requires fewer or shorter pipelines.

Figure 4-2 Water and wastewater pipeline routes to Kaukauna site



Supply water pipeline

About 23 percent (0.9 miles) of the supply pipeline route passes through residential areas. Total residential impact could amount to a maximum of 5.2 acres. Less land might be required in areas where the pipeline could be installed inside the road ROW. Impacts to residents would be largely temporary. However, any large trees in the easement ROW would be removed. During construction, access to properties would be disrupted for short periods of time.

Discharge water pipeline

The discharge pipeline would not pass through residential areas.

Pipeline commercial/business impact

Supply water pipeline

About 3.7 percent (730 feet) of the route would affect business and industrial properties. The primary impacts to businesses along the route would be temporary. A major short-term impact could be the disruption of easy access to business properties. As with residential areas, the amount of time that individual driveways would be affected would be relatively small. Fox Energy has said it would work with businesses to reduce the disruption associated with construction to the smallest time possible. Temporary access to properties would be provided and driveways would be repaired as soon as possible after construction. There would be no significant long-term impacts associated with the pipeline. See Chapter 2 for a discussion of the construction process.

Discharge water pipeline

The proposed discharge pipeline would not impact commercial properties.

Pipeline wetland impact

Wetlands and streams can be damaged by pipeline construction activities either directly or indirectly. In general, all stream and associated wetland crossings for pipelines are fairly narrow. Wetlands consist primarily of wooded wetlands immediately adjacent to streams. Direct impacts occur when open trenching methods are used and when construction vehicles are driven through streams and wetlands. These kinds of activities can negatively affect vegetation and can reduce water quality, which in turn can negatively affect a wide variety of aquatic plants and animals. For this project, Fox Energy would not use open trench construction methods in wetland or streams. Instead, Fox Energy proposes to use directional boring methods to place the pipeline below wetlands and streambeds. The use of directional boring is an effective method for reducing direct environmental impacts to streams and wetlands. Long-term impacts may include the permanent removal of trees near streams and rivers. These impacts can be limited by choosing routes that minimize the number of stream crossings and by choosing areas where forest cover is already disturbed or very narrow. More detail on impacts to wetlands from bored pipeline construction can be found in Chapters 2 and 3.

Indirect impacts to streams and wetlands occur when nearby construction activities lead to soil erosion. In this case, the large amounts of exposed soil resulting from open trench construction activities would be susceptible to erosion. The applicant would need to use erosion control methods at all times during and after construction. Standard control methods such as the DNR's BMP should be employed throughout and immediately after construction until exposed

soil has been stabilized by vegetation. This would include areas where pits are dug in order to bore beneath streams and wetlands.

Water supply pipeline wetland/stream impact

About one percent (157 feet) of the supply pipeline route would affect wetlands. Two wetlands or streams, about 0.14 acres, could be affected. These wetlands are associated with permanent and temporary streams that cross pipeline routes. Because the pipeline would be bored under streams and wetlands, little short- or long-term damage is expected. Soil erosion must be carefully controlled.

Discharge water pipeline wetland/stream impacts

About nine percent (174 feet) of the discharge pipeline route would affect wetlands. Total impact potential could be up to about 0.2 acres. The impacts would primarily affect the Fox River. Detailed information about the discharge structure's impacts to the Fox River can be found in the corresponding sections of Chapter 3.

Pipeline forest impact

The pipeline would require removal of all trees within the permanent pipeline ROW. Because buried pipelines require an ROW devoid of large growing trees, pipeline impacts to forests and woodlands can be severe. However, the largely developed nature of the project landscape and the location of pipeline routes along roads also mean that large woodlots and forests would not be affected by this project.

Forestry impacts are potentially the greatest near streams and in residential areas where ornamental or large trees near roads might be affected. Because large trees cannot be permitted on permanent pipeline ROW, impacts from construction can be reduced by using existing ROW and avoiding forest impact as much as possible through route and power plant site selection.

Water supply pipeline forest impact

About 24 percent (4,826 feet) of the supply pipeline passes through wooded areas. The area of impact to woods would be about 5.6 acres. Impacts would be associated primarily with stream crossings.

Endangered and threatened species impact

A review of the Wisconsin Natural Heritage Inventory found no known occurrences of endangered and threatened species along any of the supply or discharge pipeline routes. Some endangered, threatened and special concern species are found nearby, but because of the highly developed nature of the land along the pipeline routes little natural habitat remains. Impacts to endangered and threatened species are unlikely. Impacts to stream banks would be avoided by boring beneath stream beds.

Historic and archeological resources impact

An archeological review of the project area found no significant historic or archeological sites or resources. There is no guarantee, however, that during construction an archeological discovery would not be encountered. Discovery of any archeological items should be immediately

reported and construction in that area should cease until an appropriate response can be implemented.

Storm water management

Because more than five acres of land would be disturbed by this project, permits are required to control erosion and prevent sediment from entering waters of the state. Pursuant to Department of Commerce and DNR (Wis. Admin. Code ch. NR 216) requirements, Fox Energy is required to develop and implement construction and operational erosion control and storm water management plans.

The Kaukauna site drains through culverts and ditches into tributaries of Apple Creek. Under existing conditions, total site surface water runoff is influenced by how much rainwater can infiltrate the ground instead of becoming surface runoff. Power plant buildings and associated structures would be impervious surfaces where soil and vegetation once existed, and rain and surface runoff would not be able to infiltrate the ground in a natural manner. Impervious surfaces such as concrete, packed gravel roads and fabricated buildings would cause an increase in surface water runoff from the site into the tributaries of Apple Creek unless appropriately managed.

Inadequate measures to control storm water runoff would increase the volume and velocity of surface water runoff, which would increase flows, erosion, and the deposition of suspended solids, such as eroded soils, into the Apple Creek tributaries. In order to prevent this from occurring, DNR regulations require approval of a storm water management plan for structures and management practices that slow down flows and detain surface runoff. Structures such as grass berms (filter strips) and storm water detention ponds would help settle out suspended solids and govern the velocity and volume of the surface runoff to allow solids to settle. On a regional scale, preventing "flash" or "peak" runoff events from development projects helps to reduce runoff during periods of heavy rain or rapid snow melt.

Vegetation and wildlife

Existing

Predominant vegetation types and communities

Agricultural row crops (corn) cover approximately 98 percent of the site. Approximately two percent of the site is composed of bare ground or grassed ditches associated with agricultural drainage. Occasional weedy species such as redroot amaranth (*Amaranthus retroflexus*), annual ragweed, and night-flowering silene may be found throughout the periphery of the agricultural fields.

Throughout the site, tiling systems have been installed to drain the area for agricultural development. These areas have been planted with several non-native grasses for erosion control, including quackgrass (*Agropyron repens*), smooth bromegrass (*Bromus inermis*), and timothy (*Phleum pratense*). In disturbed pockets occurring along these tiled systems, weedy species such as wild parsnip (*Pastinaca sativa*), common milkweed (*Asclepias syriaca*), lesser burdock (*Arctium*

minus), mapleleaf goosefoot (*Chenopodium simplex*), velvetleaf (*Abutilon theophrasti*), Canadian thistle, and eastern daisy fleabane may persist.

Predominant animal types and communities

Wildlife in the area consists primarily of common species for the region. Some species have been observed in peripheral openings and along drainage ways. The tracks of white-tailed deer and raccoon have been observed around tiled ditches and in the surrounding cornfield. Eastern cottontails have been seen near the southern and eastern boundaries of the site. Several species of birds including red winged blackbird, American goldfinch (*Carduelis tristis*), barn swallow (*Hirundo rustica*), and European starling (*Sturnus vulgaris*) have been observed in the surrounding fields and tree rows.

Nuisance species

Since the site is primarily in row crops, the primary nuisance species are the weedy species generally found in farm fields and fencerows.

Threatened and endangered species

There are no known occurrences of threatened, endangered, or Wisconsin special concern species on or in the vicinity of the project site. No threatened, endangered, or Wisconsin special concern species have been found in surveys of the site. Correspondence from the DNR-BER states that future comprehensive endangered resource surveys would not be warranted based upon the developed nature of the project area.

Most of the Kaukauna site is under cultivation for row crops and lacks vegetation for part of the year. The site does not have suitable natural habitat for any threatened, endangered, or Wisconsin special concern species that are known to exist in the surrounding the area. All non-cultivated land is associated with the site's drainage ditch systems. These areas have a high degree of disturbance and are dominated by introduced grasses and forbs.

Construction impacts and mitigation

Construction would directly impact most of the site, including removal of agricultural lands and realignment of drainage ditches. Impacts would result from clearing, filling, dredging, and paving. Construction operations for the plant would not be expected to impact areas outside of the plant construction site, including adjacent wetland and forested areas. Although the project might affect individuals or local populations of some species, it would not affect the stability of the species populations in the region.

Fox Energy is planning to retain a licensed landscape architect to develop a landscape plan suggesting plantings designed to soften the view of the facility or to improve wildlife habitat with native vegetation that provides cover and food for wildlife.

Local Community

Site history

The Kaukauna site has been continuously farmed since about 1927. It has not been used for any other purposes during that time.

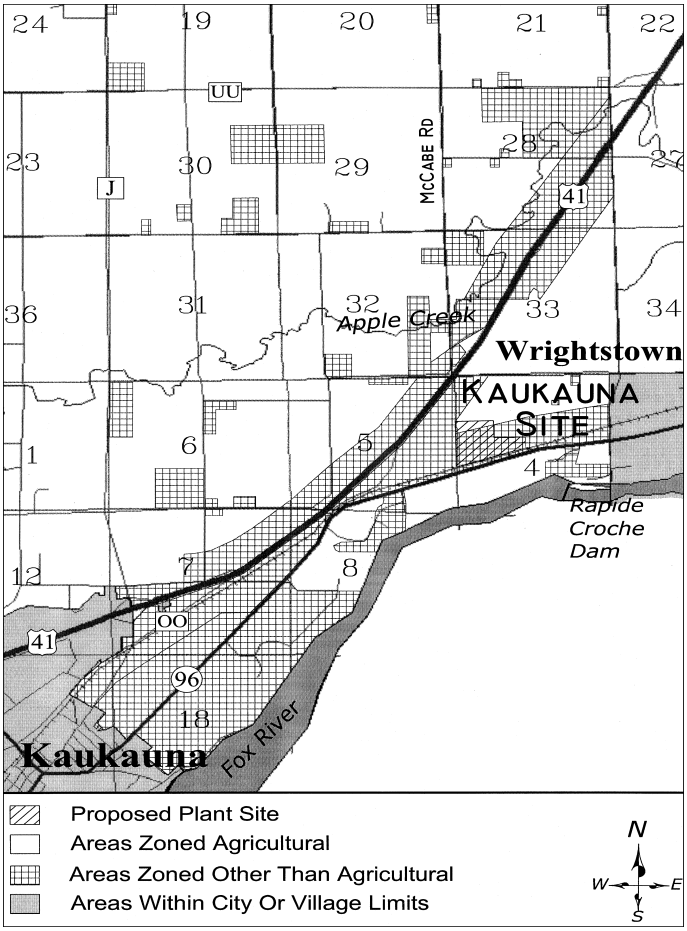
In 1965, WEPCO was granted a utility easement to construct, maintain and operate an electric power line on a portion of the site.

Land use

Existing land uses and zoning

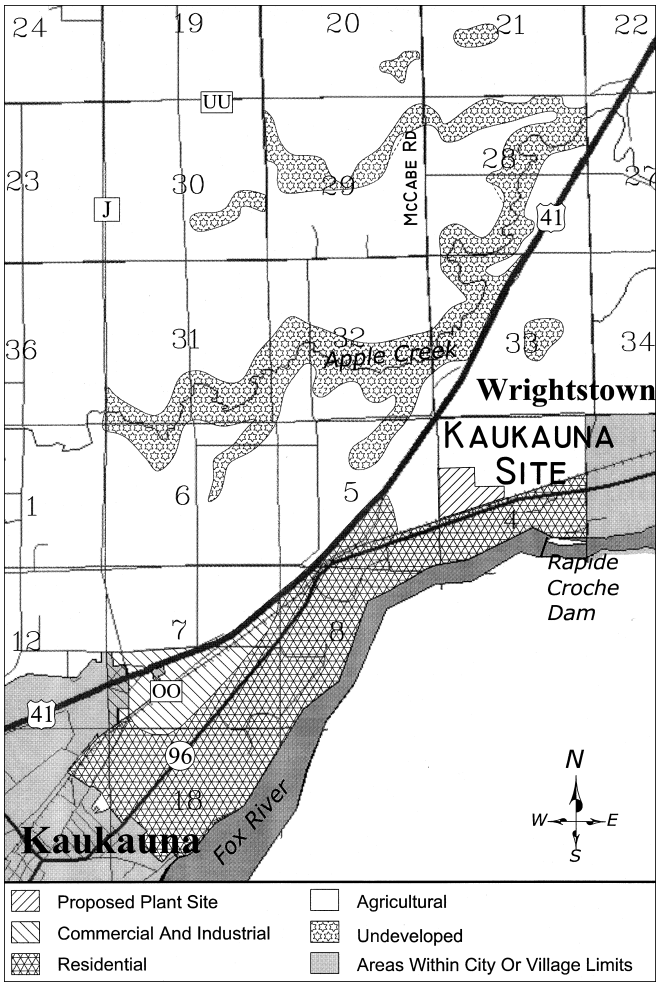
The site, consisting of one 54-acre parcel of land, is used for agricultural purposes. Currently, corn is grown at the site. Land surrounding the site is also mostly agricultural, with some residential, commercial, and industrial developments (see Figure 4-3).

Figure 4-3 Town of Kaukauna land uses



The town of Kaukauna Zoning Ordinance governs the town of Kaukauna. Based on that ordinance, the proposed power plant site falls within Light Industrial and Agricultural Land districts (Figure 4-4). Without a special exception, the ordinance would not allow construction of a facility such as the proposed power plant in an Agricultural or Light Industrial district. Consequently, Fox Energy filed a petition for an amendment to the text of the town of Kaukauna Zoning Ordinance that would allow use of the land by a natural gas-fueled electric generating plant. Approval of the amendment by the town of Kaukauna Board was obtained on February 12, 2001. Ratification by the Outagamie County Planning and Zoning Committee and the County Board was obtained on March 13, 2001. The Outagamie County Board ratified the amendment on March 27. The amendment to the ordinance is conditioned on the Commission's approval of the CPCN application for the plant. With an amended zoning ordinance, it would appear that siting of the power plant at Kaukauna would not conflict with local zoning.

Figure 4-4 Town of Kaukauna zoning classifications. adapted from the Outagamie County Zoning Atlas



Changes to land use from construction or operation

Upon completion of the project, approximately 27 acres of the 54-acre site would be occupied by the plant and associated facilities. Approximately 30 parking spaces would be available for employees and visitors. The acreage initially used as lay-down and parking areas during construction would be seeded or planted to restore grasses, forbs, and woody plants native to the area. Surrounding land uses would not be expected to change as a result.

Compatibility with local land use plan

Given the effort to change the local zoning, the plant can be considered to be compatible with local land use plans.

Local community services

Water or wastewater utility

Water for all process uses would be supplied by HOV. Potable water would be supplied by one low-capacity well on site, or through an existing municipal supply. Fox Energy would construct and operate both the raw water supplier and a wastewater receiving system for the project, so no utility assistance is necessary for that. HOV can supply a maximum of 5.3 MGD during summer peak hours and 4.24 MGD on average. Fox Energy would also construct its own water storage facility.

Refuse collection service

Fox Energy would privately contract for solid refuse disposal. No municipal services would be required.

Police

During both the construction and operation of the plant, law enforcement services would be provided by the Outagamie County Sheriff Department. The town of Kaukauna does not have a police department.

Fire protection and Emergency medical services

The town of Kaukauna and the town of Vandenbroek have a joint volunteer Fire Department and a joint First Responders that would provide the facility with fire protection and rescue services during the construction and operation of the plant. In addition, the town of Kaukauna has a mutual aid agreement with all the neighboring towns, cities, and villages that can be called upon during an emergency. The city of Kaukauna provides ambulance services. There would be no additional cost to any town of Kaukauna residents or businesses from the normal construction and operation of the facility.

Schools

Plant construction and operation would not be expected to increase the population significantly. No impacts to kindergarten through twelfth grade enrollment would be anticipated.

Roads and railroads

Existing

There are several major roads and highways near the Kaukauna site (see Figure 4-1). Wrightstown Road runs east and west and is located to the north of the site. USH 41 runs southwest to northeast and is located on the northwest side of the site. The WCL Railroad and STH 96, both running east-west, are located immediately to the south of the site. County Line Road running north-south is located east of the eastern boundary of the site.

Required additions or surface changes

One access road from the plant onto the frontage road along USH 41 would be built. No additional roads or surface changes to existing roads would be required for the construction or operation of the plant.

Impact during construction and operation

The intersections of STH 96 with County Line Road and USH 41 with Wrightstown Road are the two intersections closest to the site. They were studied in 1997 by the DOT for traffic congestion. On average, 3,600 vehicles daily cross the intersection of STH 96 and County Line Road. The USH 41 and Wrightstown Road intersection handles 36,400 vehicles daily. The capacities of the roads nearby are great enough that the projected temporary increases in traffic flows during construction could be accommodated and would create only temporary impacts.

Transportation of materials and construction for the electric transmission lines, natural gas pipelines, and water lines could result in temporary lane closures. These closures would be coordinated with the village, the county, or the DOT as appropriate.

During the operation of the plant, the facility would employ approximately 24 permanent employees. Twenty employees would work during the day shift, and four would be on the night and weekend shift. The impact on traffic would be insignificant during the operation of the plant.

Fogging and icing

Potential for plume development

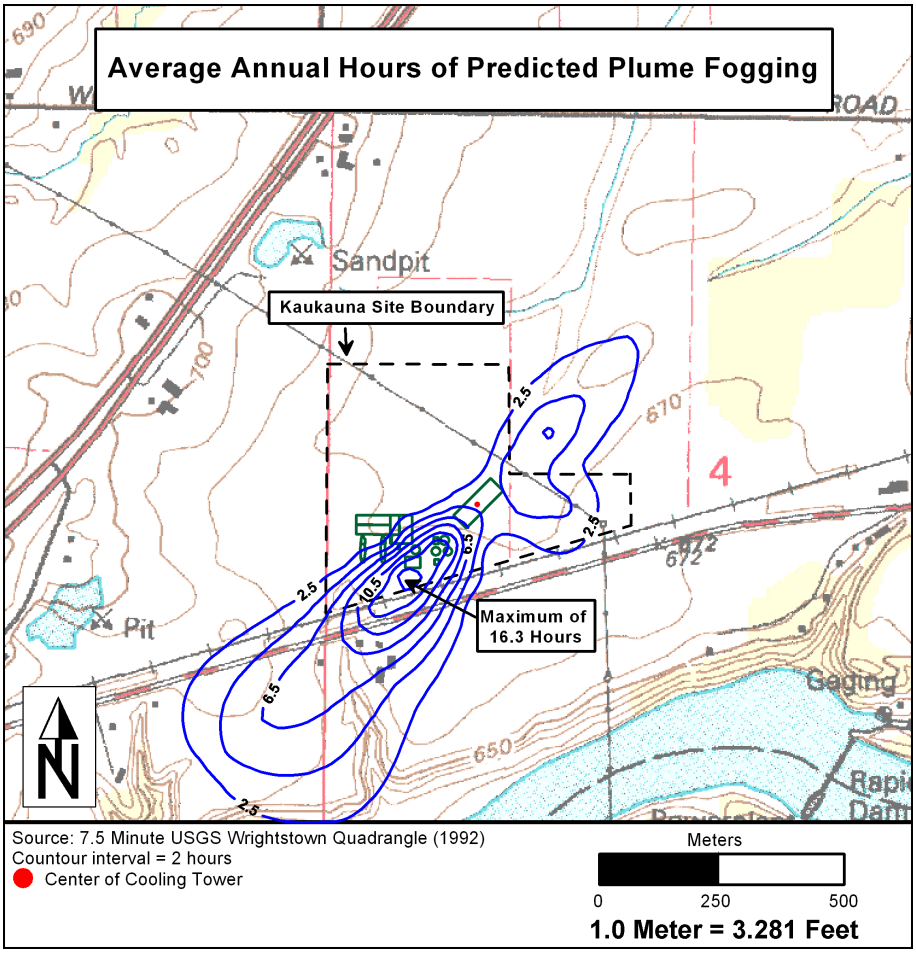
When a power plant is running, the cooling tower dissipates waste heat from the heated water of the steam turbine. It also discharges water vapor into the atmosphere. When heat from a power plant is released to the atmosphere through the cooling towers, a water vapor plume that has length, breath, density and direction is formed. The characteristics of the plume depend on weather conditions and the design of the cooling tower. A visible plume is considered a negative visual impact, and can affect driving conditions. A plume touching the ground results in fog, and when the temperature is below freezing, the fog changes to ice on road surfaces.

Potential for fogging and icing

To quantify the potential for local fogging and icing from the cooling tower water vapor discharges, Fox Energy used the Electric Power Research Institute's SACTI computer model to predict how many hours per year the plume from the proposed plant would create fogging or icing conditions on the surrounding area.

The result of the modeling shows that between 2.5 and 16 hours per year, fogging is possible within approximately 3,000 feet from the cooling tower. As the contours in the diagram in Figure 4-5 show, the number of potential hours of fogging would range between 2.5 and 10.5 hours per year along a distance of approximately 2,000 feet of the nearby highway (STH 96).

Figure 4-5 **Map showing areas and numbers of hours of predicted fogging from the proposed power plant at the Kaukauna site**

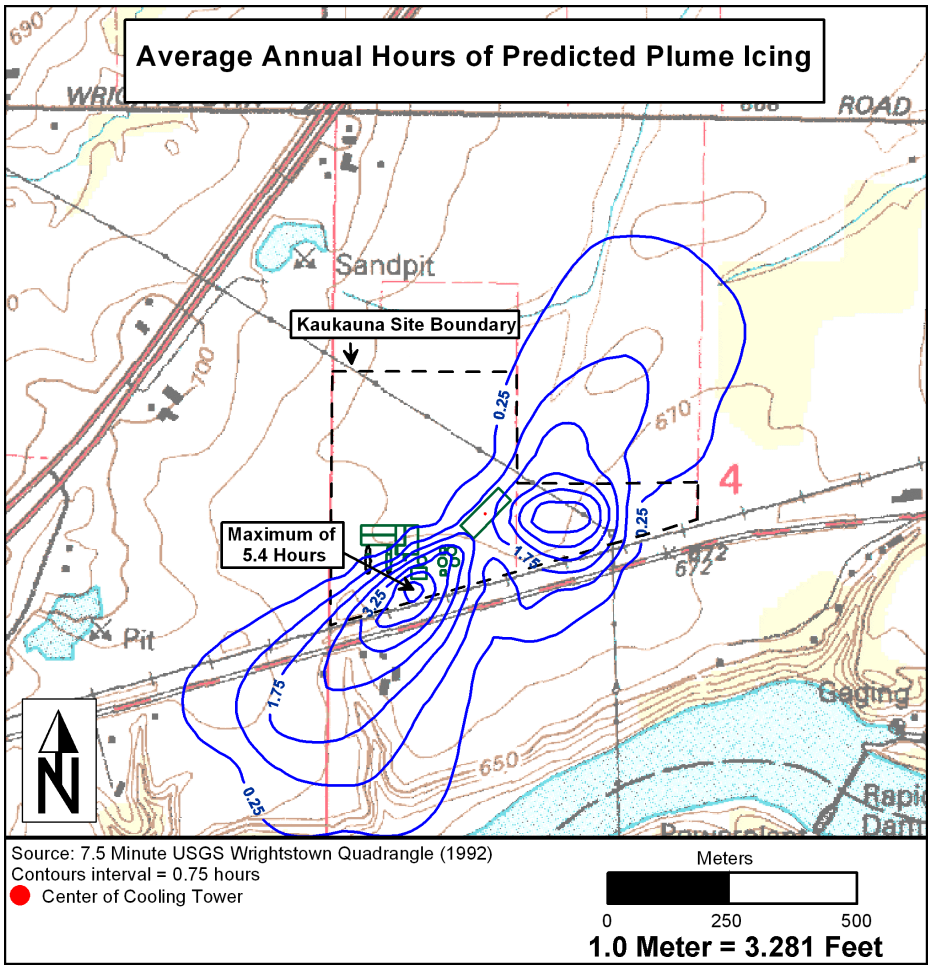


The model also predicts the possibility of ice formation within 2,300 feet of the proposed cooling tower as shown in Figure 4-6. Along the stretch of approximately 3,000 feet of STH 96, ice formation potential would range between 15 minutes and 3.5 hours per year.

While the number of hours of fogging and icing along STH 96 is small, any fogging and icing could cause real traffic hazards during those brief times.

One possible way to reduce fogging and icing, thus reducing the possibility of an accident, would be to consider using a different cooling tower design. A wet/dry tower or an all-dry cooling system have the capability to reduce or eliminate plume formation, and thus reduce fogging and icing potential, by increasing the amount of dry air released and decreasing the amount of humid air. Fox Energy has not proposed these designs.

Figure 4-6 **Map showing areas and numbers of hours of predicted icing from the proposed power plant at the Kaukauna site**



The cooling tower design would incorporate "maximum drift eliminators" to minimize the fogging and icing potential from the plant. In addition, caution signs should be placed to advise motorists of any possible icing hazard along nearby roads.

Noise

Applicable local noise ordinances

There are no local, county or state noise regulations identified for the proposed Kaukauna project site. There is, however, a local noise ordinance Section 17.53 (5) of the Outagamie Zoning Code intended to keep noise-sensitive development, such as schools and homes, from occurring within a certain area already affected by the noise from USH 41. In the absence of applicable noise regulations, the proposed facility noise emissions were evaluated against the existing acoustic environment and the EPA guideline day-night sound level (L_{dn}).

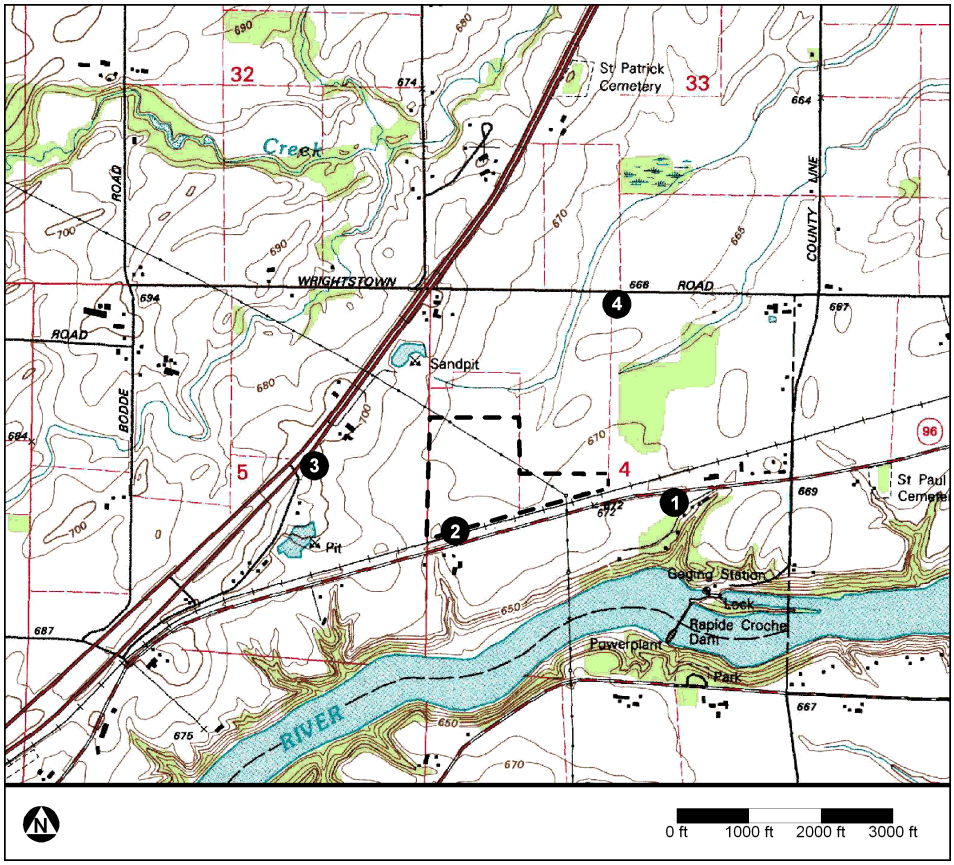
Design criteria

The noise design criteria for the proposed Kaukauna facility were evaluated using the "A-weighted" and "C-weighted" sound measurements as discussed in Chapter 3. For the proposed project in Kaukauna, with the Freedom site, the values of 48 dBA and 70 dBC from the EPA guidelines were used as noise compatibility thresholds for the surrounding environment.

Existing environment

There would be potential receptor sites and residences located in all directions from the proposed Kaukauna site. A noise evaluation was conducted by Fox Energy, September 6 and 7, 2000, to gather ambient noise data from four discrete locations surrounding the proposed project area. The sound monitoring locations are as follows: 1) south of site along STH 96 (chosen to represent the nearest residences southeast of the site); 2) south of the site in a turn-off area along STH 96 (chosen to represent the nearest residence southeast of the site); 3) near the intersection of Town Club Road and USH 41 (chosen to represent residences located along USH 41 and frontage roads); and 4) at a driveway of a residence along Wrightstown Road (chosen to represent the residences northeast of the site). Figure 4-7 shows the locations of the four receptor sites used in the noise evaluation.

Figure 4-7 Locations of the four measuring points, or receptor sites, used in Fox Energy's noise evaluation



Sound data from these four locations was used by the company to quantify existing acoustic conditions, predict facility noise emissions and assess what mitigation measures, if any, would be needed to insulate surrounding receptors from noise levels above the EPA guidelines (48 dBA and 70 dBC). The data indicated that the Kaukauna region was typical of a rural environment influenced by transportation and rail corridors. Ambient noise sources in the area were identified as local traffic, intermittent rail activity, the Fox River passing through the Rapide Croche Dam, and natural noises such as crickets.

Sound levels in the surrounding environment were examined using the two different sound references used also for the Freedom site measurements. The equivalent-continuous sound level, L_{eq}, and the exceedance sound level, L_x, were used to illustrate the level of noise at and around the four receptor sites. The L_{eq} would represent the background sound over the sample period. The L_x would indicate the statistical sound level where the sound level is exceeded "x" percent of the sampling period. The L_{eq} would be considered the average sound energy level, and the four values used for the L_x would represent the sound levels exceeded 1, 10, 50, and 90

percent of the sampling time. The usefulness of each percentage in categorizing and predicting the potential noise environment is discussed in the "Noise" section of Chapter 3.

Continuous, 24-hour noise monitoring was conducted by the company at three of the four locations for a 24-hour period. The 24-hour average L_{90} level for Measuring Point 1 (see Figure 4-7) has been estimated to be about 46 dBA. For Measuring Point 2, it has been estimated to be approximately 47 dBA. At Measuring Point 3, the noise estimate was approximately 57 dBA. The 24-hour L_{90} noise measurement at Measuring Point 4 was not taken. According to levels associated with common noise sources, these measured noise levels are moderate and comparable to the noise of soft stereo music playing in a residence or common office activities. Levels approaching 60 dBA and above would be comparable to near highway traffic (road and rail traffic above 55 dBA tends to annoy most people). Table 4-1 illustrates the continuous 24-hour noise measurements for three of the four measurement locations and compares them to the background, L_{eq}, environment at each location.

Table 4-1 Continuous (24-hour) ambient sound level measurement results, dBA

		L_{eq}[15]	L_1	L_{10}	L_{50}	L_{90}
1	Minimum	40.5	61.0	45.0	41.0	39.5
	Maximum	58.0	77.5	70.5	62.5	55.0
	Average	50.9	71.5	58.8	49.4	45.8
2	Minimum	53.0	59.0	45.0	43.0	42.0
	Maximum	73.5	91.0	72.5	61.0	53.0
	Average	65.4	74.9	56.8	49.6	47.4
3	Minimum	60.5	73.5	63.0	52.5	48.0
	Maximum	70.5	78.0	74.0	69.0	64.5
	Average	66.2	75.6	69.5	62.5	56.9

The average L_{10} values at the Kaukauna site are greater than the average L_{90} values. The average L_{10} values for the three receptor sites exceed 55 dBA. These noise levels indicate that road or rail traffic is the most likely cause of these higher sound averages.

In addition to the continuous-type monitoring, short-term noise measurements (10-minute duration) were randomly taken during the same two day test period to illustrate ambient noise during morning, midday and night. Table 4-2 illustrates the measured values and average values from each of the four monitoring sites. As discussed previously, the 24-hour measurements were conducted to characterize typical daytime and nighttime ambient noise conditions around the proposed Kaukauna site. The short-term measurements were taken in 10-minute increments during different periods of the day and night to capture intermittent noises in the existing acoustical environment. In other words, these intermittent measurements were taken to

[15] Due to equipment problems, the L_{eq} measurements at Locations 1 and 2 are averages of the number of measurements taken rather than 24-hour averages.

illustrate the amount that transient noises such as a passing vehicle or train, overhead aircraft or working farm equipment exceed existing sound level environment.

Table 4-2 Short-term (10-minute) ambient sound level measurement results, dBA

Time of Day	Measuring Point 1				Measuring Point 2				Measuring Point 3				Measuring Point 4			
	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}
Morning	41.2	39.5	38.0	43.0	41.8	39.1	37.3	40.0	62.1	51.4	47.6	58.5	50.2	48.7	47.0	48.7
Midday	NM[16]	NM	NM	NM	57.0	53.7	52.0	54.7	69.4	63.6	58.5	65.9	52.8	51.0	49.3	51.2
Night	57.0	44.9	41.9	55.5	58.2	45.5	42.9	54.3	67.2	61.4	55.8	64.1	NM[17]	NM	NM	NM
Average	49.1	42.2	40.0	49.3	52.3	46.1	44.1	49.7	66.2	58.8	54.0	62.8	51.5	49.9	48.2	50.0

Construction noise impacts

The resulting construction noise to build the proposed Kaukauna plant would consist mostly of a series of intermittent sources, most of which would originate from the diesel engine drive systems that power most construction equipment. It is likely that during peak construction, construction work may occur for 10 to 16 hours per day. Typical construction noises, as modeled for a similar power plant project in southeastern Wisconsin, are illustrated in Table 3-11[18].

Operational noise impacts

Audible noise

While construction noise would be emitted during the development of the site and erection of the plant, operational noise would be emitted throughout the life of the plant. Major noise sources introduced by the proposed project would include noises from CT generator packages, heat recovery steam generators, steam turbine generator packages, generator step-up transformers and cooling towers. Audible operational noise levels from the plant should be maintained at a low level compared to the existing ambient levels so that the overall increase in noise is minimal. The proposed Kaukauna facility noise emissions were initially modeled based on standard packaged generating equipment fitted with "stock" noise mitigation equipment. Fox Energy would have to base its final plant and equipment designs on this modeling as the

[16] No measurement (NM) taken due to near-by road construction activity.

[17] No measurement (NM) taken and no explanation given.

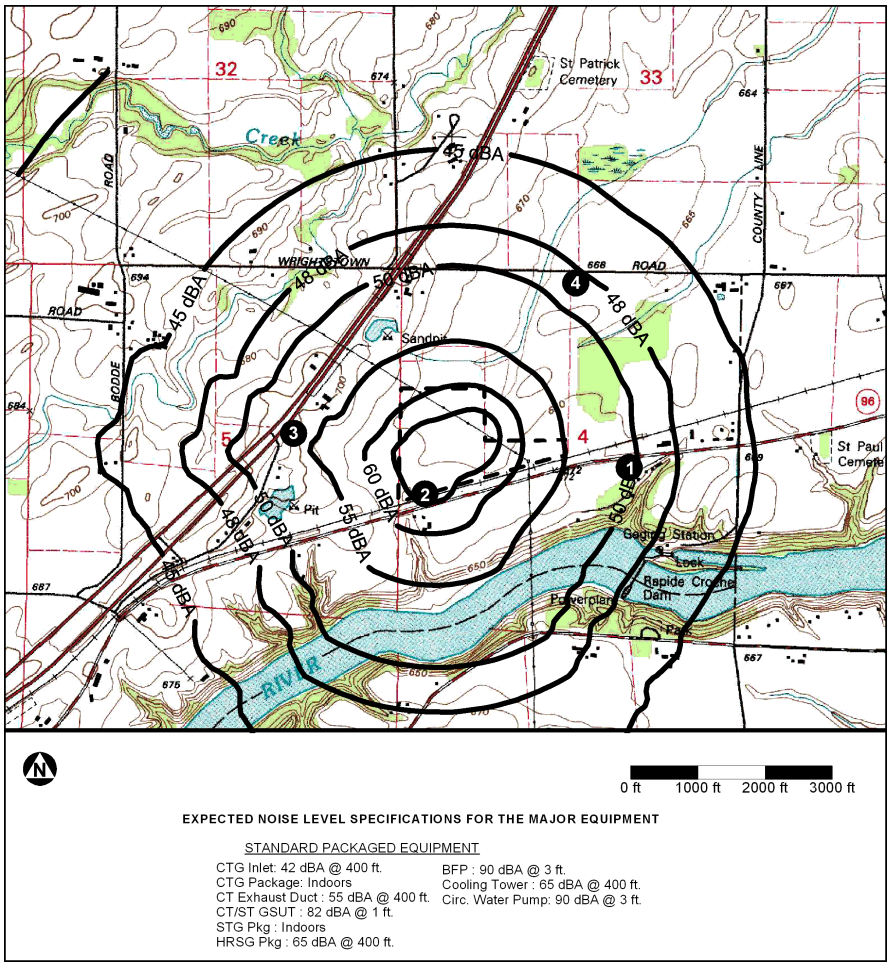
[18] Taken from the final EIS for Badger Generating Company, LLC, PSC docket #9340-CE-100.

stock noise mitigation equipment is not designed with a particular site in mind and may or may not conform to the existing acoustical guidelines. Table 4-3 lists the standard packaged equipment and its associated noise emissions. Figure 4-8 illustrates the predicted noise emissions at the local receptor sites using contours for visualization.

Table 4-3 Anticipated equipment sound level specifications for standard packaged equipment

Equipment	Noise Source Components	Sound Level Specification
CTG package	Turbine compartment, generator compartment, ventilation fans, exhaust ductwork and all other auxiliary equipment.	Indoor
CT inlet	CT air inlet.	42 dBA @ 400 feet
CT vents	CT vent fans, blowers, ductwork and associated components located or discharging outdoors.	50 dBA @ 400 feet
HRSG package	Transition ductwork, boiler, stack, stack exit, and all other auxiliary equipment included in the scope-of-supply.	65 dBA @ 400 feet
Steam generator turbine package	Compartments, ventilation fans, piping, and all other auxiliary equipment included in the STG scope-of-supply.	Indoor
Boiler feed pumps	Pump and motor assembly.	90 dBA @ 3 feet
Generator step-up transformers	Transformer with fans at maximum cooling.	82 dBA @ 3 feet
Cooling towers (12-cell)	Fans, motors, gearboxes, water splash, and all associated equipment.	65 dBA @ 400 feet
Building	Insulated metal panel system. (22 ga outer liner, 4-inch insulation, 20 ga inner liner)	STC-40 (minimum)
Building louvers	Total maximum louver area = 5% of total wall area.	Standard louver
Building ventilation	Power roof ventilators (x total).	83 dBA @ 3 feet
Fuel gas metering station	Pumps, compressors, valves, piping, and all associated equipment.	50 dBA @ 400 feet

Figure 4-8 **Predicted noise levels in dBA at local receptor sites around the Kaukauna power plant site**



Effect of the design goal

According to the standard packaged equipment noise data and the noise emission modeling results, some sound levels were measured at or above the EPA Guideline level of 48 dBA. Additionally, the sound levels are above the typical background sound levels at most locations surrounding the proposed Kaukauna site. The facility sound levels would need to be reduced or mitigated to achieve consistency with the existing acoustic environment.

By upgrading the noise mitigation equipment beyond the standard packaged equipment Fox Energy could possibly achieve consistency with the existing acoustic environment. However, further noise emission modeling using equipment upgrades apparently shows that the upgraded equipment alone does not appear to solve all of the noise emission exceedance levels. Receptor sites 2 (58 dBA) and 3 (50 dBA) would still be exposed to potential noise emissions over the EPA guideline (48 dBA) for the background environment. Further mitigation measures would have to be taken for these areas. Measures that could be taken include noise attenuation equipment on the cooling towers and the erection of barrier walls to the north of the plant.

Landscaping techniques could also mitigate noise emissions. Fox Energy has committed to incorporate landscaping and native tree species to mitigate the noise impacts.

It appears, from the modeling results that equipment upgrades would sufficiently mitigate noise emissions at Receptor Sites 1 (48 dBA) and 4 (48 dBA). At these locations, the proposed facility noise emissions are consistent with the existing ambient noise environment.

Low frequency noise

As discussed in Chapter 3, low frequency noise and vibration have been identified in some Wisconsin CT plants. Sound waves in the frequency range below 40 Hz, if high enough in magnitude, can couple with building frame walls and windows and cause vibration. On the other hand, as discussed in Chapter 3, the vibration problem does not generally occur with combined-cycle plants. In combined-cycle plants such as the proposed Kaukauna facility, the turbine exhaust gases would be directed through a heat exchanger system and HRSG rather than to the atmosphere directly through an exhaust silencer. The exhaust gases would lose energy in the boiler tubes. Low frequency exhaust noise would be reduced to very low levels, and vibration problems would not appear. For this project, even when the plant is only in the CT mode, the exhaust gases would go to the heat exchanger system.

The company provided measurements and estimates for this project using the C-weighted scale, which more easily enables identification of low frequency noise. Table 4-4 shows a comparison of existing C-weighted noise versus the projected C-weighted noise emissions with the aforementioned upgraded equipment.

Table 4-4 Comparison of existing C-weighted background sound levels and project C-weighted facility noise emissions with upgraded silencing equipment

Receptor Sites	Representative Measurement Location	Range of Measured C-Weighted Background L_{90} Sound Level, dBC	Predicted C-Weighted Facility Sound Level, dBC
Southeast of site	1	49.6 – 52.5 dBC	58 dBC
South of site	2	50.4 – 59.7 dBC	75 dBC
North of site	3	55.7 – 65.3 dBC	64 dBC
East of site	4	51.6 – 58.7 dBC	61 dBC

As discussed previously, the EPA Guideline calls for a C-weighted sound level of 70 dBC or less as an acceptable sound level within residential locations. According to Table 4-4, the modeling results indicate the proposed facility noise emissions would be at or below the 70 dBC at all but one of the receptor sites. Further noise mitigation would be necessary for this residence.

Prominent tones

As discussed in the "Noise" section of Chapter 3, even though many pieces of the combined-cycle plant equipment would be potential tonal noise sources, the broadband sources (towers, turbines, and generators) would be much more prominent and would mask them within 1,000 feet.

Visual landscape

Existing visual landscape

In this region of Wisconsin, farmland is contiguous across much of the rural landscape. With the exception of USH 41, the roadways surrounding the proposed Kaukauna site consist of an interstate frontage road, county roads, state highways, and rural streets. Several farmsteads and residences are proximal to the proposed Kaukauna site to the north, south, east and west. There is some small-scale commercial development along the north and south side of USH 41 to the north of the site but the surrounding area is predominantly agricultural and residential. The landscape is generally flat with small clusters of woods interspersed with farm fields, so that people can see for long distances.

From USH 41, the entire Kaukauna facility would likely be visible and would probably be highly visible from Wrightstown Road, Town Club Road, and STH 96. Additionally, the plant, or at least some of its taller structures, could possibly be visible from CTH ZZ along the south side of the Fox River, to the south of the proposed site. Depending on the final height of the plant stacks, they could be visible from most vantage points in the immediate area. It is reasonable to assume that the plant or the stacks would be a dominant and unique feature on the landscape. The proposed power plant buildings would give a strong visual impression of modern industry. However, the existing farm field on the proposed site and the surrounding farms give a strong visual impression of rural Wisconsin. The only visual indication of industry is the 345 kV transmission line that traverses the proposed site north and south and a natural gas line crossing to the southeast of the site along STH 96. Figure 4-9 shows a plant rendering as it would be viewed looking east. Figure 4-10 shows this same vantage point of the site with its current land use and the transmission line traversing the site.

The locations from which the proposed plant would be most visible would probably be:

1. A farmstead and some neighboring residences along STH 96 to the southwest of the proposed site.
2. Farmsteads and homes along STH 96, CTH U, and Wrightstown Road to the east and northeast of the proposed site.
3. Several homes and farmsteads along Town Club Road to the north and northwest of the proposed site.
4. A home on CTH ZZ directly south of the proposed site.
5. A new golf course under construction to the north of the site.

Figures 4-10, 4-11, 4-12, and 4-13 show views from all directions looking towards and across the proposed site. Using the pictures listed above and comparing them to the plant rendering in Figure 4-9 one might visualize how the plant may appear on the landscape from all directions.

Figure 4-9 **Image of the proposed plant at the Kaukauna site by Fox Energy, looking at the plant to the southeast**

Figure 4-10 **View of the proposed Kaukauna site to the southeast**

Figure 4-11 View of the proposed Kaukauna site toward the south from Wrightstown Road

Figure 4-12 View of the proposed Kaukauna site toward the southwest from Wrightstown Road

Figure 4-13 View of the proposed Kaukauna site toward the east from Town Club Road

Figure 4-14 View of the proposed Kaukauna site from the south across the Fox River

Changes in views and impacts of construction and operation

Changes in views

The current views, from various vantage points around the proposed site, include farm fields, small patches of woods to the south and east of the site, farmsteads and residences north, south, east and west of the site, billboards and USH 41 to the north, an active railroad corridor paralleling STH 96 to the south, and an existing 345 kV transmission line that is oriented northwest-to-southeast across the proposed site. The various power plant structures, including buildings, exhaust stacks, cooling towers, water storage towers, and a substation, range in height from 25 feet to a maximum of 185 feet (the exhaust stacks). As it is proposed, the power plant would be oriented such that the generators, buildings, and cooling towers would be situated along the southern property boundary of the proposed site along STH 96. The property line would be approximately 200 feet north of that road, and it is likely that the structures would be no more than 500 feet from the road. All plant facilities except the storm water management pond would be southwest of the 345 kV line. The plant access road would follow the 345 kV line northwest across the site and connect with Town Club Road.

Views from USH 41, Town Club Road, Wrightstown Road and STH 96 would likely include views of most of the plant and its facilities due to the heights of structures dwarfing the crops and trees on and adjacent to the site. The current view of the site includes a home directly northeast of the site, farm fields framed by woods, an existing 345 kV transmission line, and a horizon of farms and silos. There is nothing currently on this site that would draw attention away from the surrounding landscape. In its current land use, the proposed Kaukauna site blends with its surroundings. The plant would likely become more visible when foliage is absent.

Directly to the east of the proposed site is a horse farm. There is a small woods that separates the proposed project site and the farm. The trees would likely obscure most of the structures on the site except for the 185-foot exhaust stacks. Across STH 96 from the horse farm are several properties that would probably have a more substantial view of the power plant facilities. Further east, along CTH U the same would be true. It is likely that only the exhaust stacks would be visible from the village of Wrightstown.

Views from the south along the Fox River would likely include the proposed plant's stacks and other structures, depending on vantage point. The same may also be true for scattered residences west along STH 96 and a small housing subdivision approximately 0.5 miles west of the site on Shawn Court.

Construction impacts

From a visual perspective, the construction of the proposed plant could appear chaotic or interesting, depending on the viewer's frame of mind. It could also appear out of place, given the bucolic setting of the existing farms, fields and woods.

Impacts of operation

The proposed plant would change the view of people living in or working around the houses nearest to the site. These people would no longer see only the 345 kV transmission line, but also

a commercial-looking building and industrial facilities. Although the buildings would be colored and built to blend with the surrounding landscape, there are few features on the existing landscape such as large barns and farm outbuildings that have any similarities to the proposed plant.

The actual views seen by people in the general vicinity of the houses and farmsteads, would vary depending on the location of windows, the screening provided by yard trees and bushes, the habits of individuals, and the direction in which people are looking. Generally, people living near or driving past the site would lose the sense of open countryside when looking across the site. There are no structures, natural or manufactured, that are tall enough to screen out the proposed exhaust stacks, cooling towers, and substation facilities.

Mitigation methods

There is probably no way to mitigate the visibility of the plant. However, the final appearance and overall aesthetic effect of the proposed plant could be altered by a number of details, such as bush and tree plantings, fences, berms, paint colors, and lighting. The success of this type of mitigation depends on the final design. Fox Energy has committed to a landscape plan that maintains naturally appearing features as much as possible.

Lighting

As discussed in the "Lighting" section of Chapter 3, Fox Energy would light the plant site in a manner similar to other industrial sites, using directional lighting and avoiding light shining into adjacent properties. Lighting may also increase at special times during construction or operation (for construction at night or during special plant maintenance). Overall, the level of light would increase near the site, but any intense glare or lighting with the source directly visible beyond the zoned boundaries would violate the local ordinance. Lighting would be provided for all structures and equipment operating areas, typically about five-foot candles average outdoors about 0.5 foot candles average along roadways. Exterior areas would utilize enclosed and gasketed high-pressure sodium fixtures suitable for the environment. All fixtures would be provided with prismatic or flat glass refractors to provide maximum luminance control in a downward direction. All fixtures would be rigidly supported from structures or from galvanized steel poles. Typical street lighting would be from 150-watt high-pressure sodium roadway luminaries installed on 35-foot poles with six-foot bracket arms. Structure and equipment operating areas would generally be lighted from 100-watt high-pressure sodium luminaries. Outdoor structure lighting for operating areas, such as the transformer areas, would be controlled from a photoelectric controller and contactor that includes a hand-off-auto switch for manual control capabilities.

Historical and archeological sites

Known and listed historic properties

Under Wis. Stat. § 44.40, the Commission must determine if project construction and operation could affect historic properties listed with the WHS. The listings at the WHS show no traditional cultural, archeological, or historic architectural properties at the power plant site that

would be affected by the construction and operation of the proposed power plant. The only historic property listed along the proposed water supply and discharge line would be the Rapide Croche Dam itself, which would most probably not be adversely affected.

Compliance with the National Historic Preservation Act

Because there are federal permits and approvals required for the plant, the more stringent federal requirements of Section 106 of the NHPA might supersede those of Wis. Stat. § 44.40. Section 106 applies to all construction aspects necessary for the power plant project. Enforcement is through the federal permits and approvals. Requirements could include field surveys and other investigations to locate and determine the significance of any historic, archeological, or cultural resources in the project area and a requirement to enter into a memorandum of agreement with interested parties about how these resources are to be treated.

Potential impacts

It is always possible that undiscovered artifacts or archeological sites might be found. If such finds were made, they would need to be reported to the WHS at once. If human remains were discovered at any time during the project construction, construction would stop and Fox Energy would need to contact the WHS immediately for compliance with Wis. Stat. § 157.70, which provides for the protection of burial sites.

Sensitive or vulnerable communities

There are 43 private residences and seven publicly owned buildings within a half mile of the proposed site. Due to new construction, the number of residences is expected to increase to the north of the site. An elementary grade school and the community hospital are 3.5 and 4.5 miles southwest of the proposed site, respectively. No adverse health impacts are expected. Potential impacts from air emissions, visual landscape changes, traffic changes, or noise are discussed elsewhere in this chapter.

Local economics

Shared revenue

Under current Wisconsin gross receipts tax law, a merchant plant such as the Fox Energy facility would be assessed an annual gross revenue license fee in lieu of local property taxes.

Under current Wisconsin revenue sharing law, an estimated $750,000 per year would be distributed by the state to Outagamie County, and $375,000 per year would be distributed to the town of Kaukauna.

Jobs and other economic benefits

During the peak construction period, the project would be expected to generate 400 to 500 jobs, approximately $50 million in local expenditures, and a payroll of approximately $27 million.

Once in operation, the plant would have approximately 24 full-time employees, mostly residents of the local community. Fox Energy states that those who were hired from outside the community would be expected to relocate and become residents of the community.

As described in Chapter 3, Fox Energy has stated its intention to be an active member of the local community, participating in charitable and community service organizations.

Development impacts

No secondary development would be expected to occur if the power plant is built. Natural gas is already available in the area. The new natural gas and water pipelines to the proposed plant would not be designed to serve any other customers. The electric transmission line connected to the proposed power plant would not serve other customers, and the power that the plant produced would be sold wholesale through the transmission system. Fox Energy has stated it has no intention of selling steam.

Planned public outreach activities

Public information meetings

Fox Energy stated its intention to continue to maintain contact with the community to keep them informed of the project status. On August 7, 2000, Fox Energy held a public information meeting in the Kaukauna Town Hall. The meeting was advertised in three editions of the Appleton Post-Crescent newspaper prior to the meeting. Invitations to the meeting were also sent to neighbors within one half mile of the site. PSC and DNR staff attended the meeting. On November 13, 2000, the company conducted another public information meeting shortly after completing and submitting the air permit and CPCN applications. The same persons were notified about the second meeting, which also was used by Fox Energy to announce its proposed electric transmission and water pipeline routes. Its May 23, 2001, meeting involved landowners along the entire water pipeline route.

ATC, which became an applicant in March 2001, held its first public meeting about the electric transmission portion of the project on June 14, 2001.

If the plant were approved at the Kaukauna site, the company's stated intention would be to hold a groundbreaking ceremony that would be open to the public and well publicized. In addition, local media would be able to take periodic tours of the facility as construction progressed.

Opportunities for public input

In its newspaper advertisements, letters to the neighbors and information packets, Fox Energy provided a telephone number and an opportunity for the public to call the company for questions regarding the project. This avenue of contact could be maintained available in the future as well.

Natural Gas System

Description of existing natural gas system and proposed facilities

ANR owns a 30-inch pipeline that operates under a MAOP of 975 psig and passes approximately 700 feet from the originally proposed project site boundary. A metering station and the pipeline tap would have to be installed on the ANR pipeline along with a new gas service line to the proposed project.

Originally, there were two new gas line routes proposed (see Figure 4-15). The primary route was located in currently farmed land. The alternative route ran underneath the Wisconsin Central Limited Railroad and STH 96 and then through currently farmed land. By changing the site shape and extending it eastward to about 230 feet from the existing ANR pipeline, the company ensured that the majority of the primary route would run within the power plant property boundaries. Such a substantial advantage eliminates the need to consider the alternate route. The gas pipeline would be approximately 2,500 feet long, 12 inches in diameter, with a MAOP of 975 psig. It would require a 50-foot construction easement and 30-foot permanent ROW. This gas service line would be constructed using standard construction practices and would be in compliance with all applicable state and federal codes.

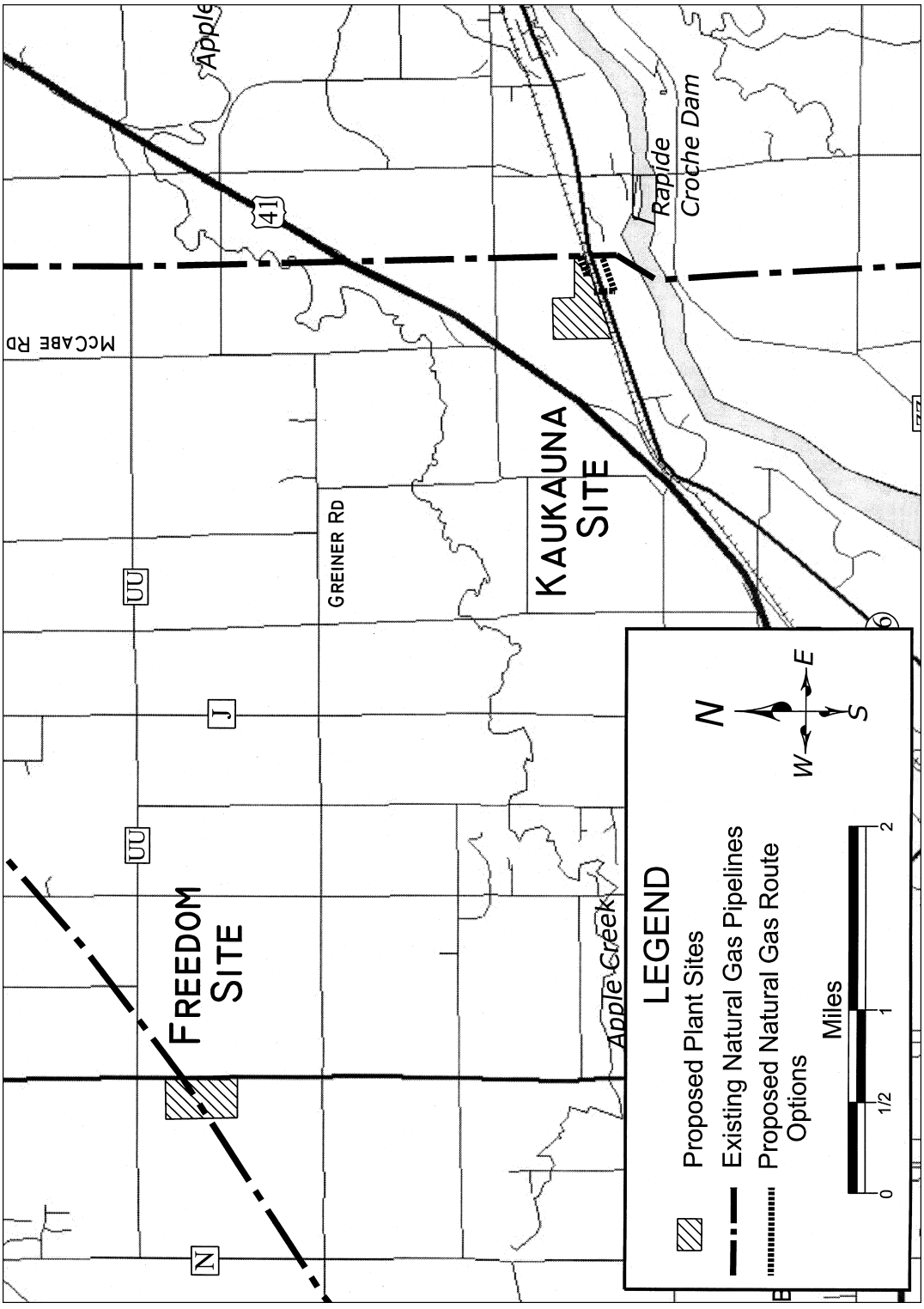
Environmental factors

Since the existing ANR natural gas pipeline is located closer to the new site boundary, only 230 feet away, there would be fewer off-site impacts expected than described in the original draft EIS. Most pipeline impacts would be part of the overall impacts to the Kaukauna Site. Potential permits needed at the local, state, and federal levels are listed in Table 1-1.

The ROW width would be 50 feet for construction and 30 feet for permanent use. It would have a substantial part of its ROW in common with the existing ROW for the ANR line as the route enters the ANR ROW to tap the ANR pipeline.

The route would affect no streams, endangered or threatened species, or known archeological sites. The company states that the off-site land north of the pipeline route would be returned to its preconstruction condition with the preconstruction contours reestablished. No disruption of groundwater flow is anticipated. Revegetation would be done in a manner compatible with preconstruction conditions and adjacent vegetation patterns.

Figure 4-15 **Proposed route alternatives for natural gas line to serve the power plant at the Kaukauna site**



The pipeline would cross a small amount of farmland, affecting less than a half acre of the plant site. Fox Energy does not anticipate drainage tile interference. However, if tile exists off site and is damaged, the company states that it would repair the damage promptly and restore the drainage system to normal. Although existing soil horizons could be maintained separately during construction, there would be at least temporary impacts on soil structure and resulting crop yields, because of compaction by heavy equipment and the digging up and replacing of the soil horizons in the trench. The trench would be backfilled using material originally excavated from the trench, if possible, and the fill would be compacted to avoid future settling. Testing for soil compaction would be done by the company in both the topsoil and subsoil to determine the need for remedial measures.

There would be no noise or odor impacts expected from the installation or operation of the pipeline, other than those associated with routine construction practices.

5

Chapter 5 – Electric Transmission System Changes and Impacts

Existing Electric Transmission System

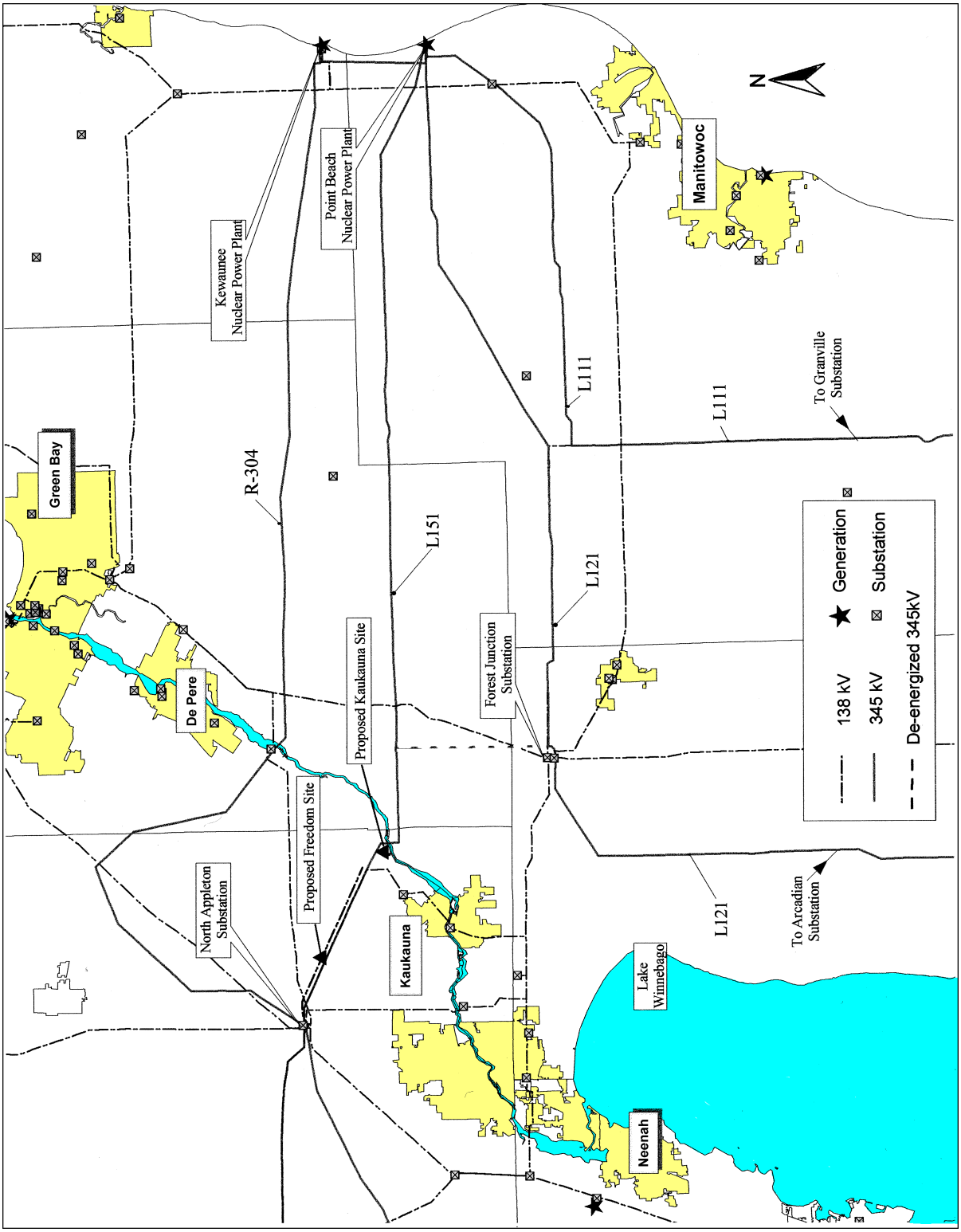
Figure 5-1 shows the existing transmission system in the project area. Both 138 kV lines and 345 kV lines—the highest transmission voltage used in Wisconsin--are shown.

Some of the transmission lines included in Figure 5-1 were previously part of the transmission system of WPSC, and some were part of the WEPCO transmission system. As of January 1, 2001, however, all of these lines have been transferred to ATC, which has taken over responsibility for ownership and operation of the transmission system from a number of eastern Wisconsin utilities. Those utilities are now joint owners of ATC[19].

Figure 5-1 shows that there are several 345 kV lines in the area. This suggests that the system should be able to accommodate new generation. In addition, the figure shows that the Point Beach and Kewaunee power plants, which together generate a large amount of electricity, are also located in the area. The presence of these existing plants makes it more difficult for the system to accommodate new generation. Finally, the figure shows a line segment identified as a de-energized 345 kV line (this is the dashed line extending due north from the Forest Junction Substation). This de-energized Forest Junction (DEFJ) line is not presently in service. It could be placed in service, however, as part of a new connection between the proposed power plant and the Forest Junction Substation.

[19] The ATC is a transmission-only public utility that has as its sole purpose "the planning, constructing, operating, maintaining and expanding of transmission facilities that it owns to provide for an adequate and reliable transmission system that meets the needs of all users that are dependent on the transmission system and that supports effective competition in energy markets without favoring any market participant." (Wis. Stat. § 196.485(1)(ge)). ATC construction projects are regulated by the PSCW in the same way that electric utility projects have been in the past. As a matter of interstate commerce, the ATC's transmission service rates and conditions of service are regulated by the Federal Energy Regulatory Commission.

Figure 5-1 Existing transmission system in project area (100 kV and above)



Transmission Interconnection Options

"Loop" and "No Loop" solutions

The simplest approach to interconnecting the proposed plant to the transmission system would be to connect the plant directly into the existing PBNA 345 kV line that crosses the proposed sites. This would involve no significant new transmission line construction. Preliminary analysis, however, indicates that this is not a feasible approach because of potential problems caused by adding a new generation source in the same part of the transmission system as the existing Point Beach and Kewaunee plants. For this reason, Fox Energy is proposing two transmission interconnection solutions that involve some new transmission line construction. A "Loop" solution would connect the proposed plant into the existing PBNA 345 kV line and would also include a new 345 kV connection between the proposed plant and the Forest Junction Substation, using most or all of the existing DEFJ line. A "No-Loop" solution would also include the connection to Forest Junction, but instead of supplementing it with a connection to the existing PBNA line, a new transmission line would be constructed to connect the proposed plant to the North Appleton Substation.

It is important to note that these interconnection options are not the same as proposed transmission line routes. Several alternative routes for new transmission lines are associated with each of the general interconnection options. These routes are described in a later section of this chapter.

Forest Junction upgrades

The existing Forest Junction Substation is connected only to 138 kV lines. As shown in Figure 5-1, a 345 kV line passes close to the Forest Junction site, but this line does not connect to the substation. WEPCO, which was the previous owner of the Forest Junction Substation, had plans to modernize this substation and connect it to the adjacent 345 kV line. ATC, which now owns and operates the transmission system, applied for a Certificate of Authority (CA) in 2001 authorizing it to build a new substation and upgrade some of the connecting transmission lines. ATC received a CA from the Commission on November 20, 2001, and the project is currently under construction. While this Forest Junction upgrade project is proposed independently of Fox Energy's interconnection solutions, it would play an important role in accommodating the output of the proposed Fox Energy plant. Moreover, all analyses of the impacts of the proposed plant on the transmission system assume the prior completion of this Forest Junction project.

The Forest Junction project will involve construction of a new substation close to the existing substation site and extension of the existing 138 kV and 345 kV lines to the new substation site. To accommodate the proposed Fox Energy plant, approximately one-half mile of new 345 kV transmission line would be required between the south end of the DEFJ line and the new Forest Junction Substation. This new line segment would be located adjacent to existing lines.

Expected Impacts on the Electric System

Interconnection study

As the transmission owner and the provider of transmission service in the project area, ATC is required to interconnect merchant power plants. In general, as part of the interconnection process, the transmission provider must carry out a study to determine what interconnection solutions are feasible, and to discover what other system improvements, if any, would be required to allow the plant to deliver power to the transmission system. While the transmission provider conducts the study, the plant developer generally pays for the interconnection, including all reinforcements that are required to accommodate the output of a new power plant. Any improvements required to accommodate the output of a new plant would be regarded as part of this interconnection project.

Prior to the startup of ATC on January 1, 2001, WEPCO was the owner of the transmission lines to which the Fox Energy plant is proposed to connect. WEPCO conducted an interconnection study in fall 2000. This study, which was included in the Fox Energy power plant application, identified feasible interconnection approaches and system upgrades that would be required to allow the plant to operate without degrading transmission system reliability. ATC has indicated that it regards the WEPCO study as valid, and it believes the conclusions of this study are definitive.

Considerations included in interconnection study

Utilities plan reinforcement of the electric power system to ensure that electric service to customers remains reliable. A reliable system is one that is able to meet customers' electricity demand while satisfying a range of system security criteria. System security criteria relate to the ability of the system to remain stable when subjected to disturbances.

The transmission system must be able to deliver power to customers over a wide range of electricity demand conditions and power plant generation levels. To accommodate the connection of a new power plant, the system must be able to continue to deliver power where it is needed without jeopardizing reliability. Moreover, standard practices require that system operation continue within allowable parameters with all transmission lines and transformers in service, and also that these parameters not be violated even under "single-contingency" conditions – that is, with any one line or transformer out of service. WEPCO thought that new generation interconnections should satisfy even more demanding double-contingency conditions, and WEPCO's interconnection study considered both single and double-contingency conditions.

Potential problems associated with connecting this system to a new source of power fall primarily into two general categories. First is the possibility of thermal overloads. When carrying large amounts of power, transmission lines and other system components heat up. This can lead to equipment damage or cause transmission lines to stretch and sag, violating safety clearances. Accordingly, thermal limits must be established that restrict the amount of power a

line is allowed to carry. By introducing additional power to the system, which nearby lines must deliver, a new plant may cause thermal limits to be violated under some circumstances.

In addition to these thermal limit considerations, connection of a new generator may degrade the system's dynamic stability. Dynamic stability involves the behavior of the single complicated system formed by the transmission network and connected generators. The generators all rotate in synchrony, which they maintain through the exchange of power across the transmission system. Under some circumstances, a line outage or other disturbance can disrupt this synchronism or otherwise cause stability to be lost. This could cause severe voltage variations, frequency variations, and disconnection of transmission lines or generating units. These problems could lead to blackouts.

Analysis can reveal whether a new plant is likely to cause thermal overload or dynamic stability problems. If the potential for such problems is only significant a few hours each year, the power plant owners might accept having to reduce generation levels during those periods to prevent problems. If the threat of problems is frequent, then some transmission improvements would probably be necessary to permit connection of the power plant. Such improvement projects might include:

1. Building a new electric transmission line.
2. Replacing an existing line's conductors (current-carrying wires) with larger ones able to carry more power.
3. Upgrading substation equipment to increase the power rating.
4. Raising or re-tensioning existing conductors to improve clearances.
5. Adding circuit breakers or otherwise changing the system configuration.
6. Improving certain generator controls that affect dynamic stability behavior.

Interconnection study results

WEPCO conducted both a steady-state analysis, which was intended primarily to discern the impact of the proposed plant on thermal limits for the lines, and a dynamic stability study. Both possible interconnection approaches described above (the Loop and No-Loop options) were considered in the study. From the perspective of power system behavior, there is little difference between the Kaukauna site and the Freedom site, and little difference between the alternate transmission line routes considered later in this section. Accordingly, while the interconnection study considered the Loop and No-Loop options separately, in each of these cases it used a single model that was deemed to be representative of both sites and all alternate routes.

As described earlier, WEPCO determined that connecting the Fox Energy plant directly into the existing PBNA 345 kV line, without any additional new transmission lines, would not be a feasible approach. Specifically, WEPCO determined that, without new transmission lines,

certain transmission outages could constrain the ability of the Fox Energy, Point Beach, and Kewaunee plants to simultaneously deliver power to the transmission system. With constraints on the ability of these generating units to deliver power to the rest of the system, dynamic stability would be adversely affected. Based on this finding, Fox Energy is proposing the Loop and No-Loop interconnection options, which demonstrate improved dynamic stability performance.

WEPCO's steady-state study of Loop and No-Loop interconnection options identified a number of thermal overloads that could result from single and double contingencies with the Fox Energy plant in service. Many of these problems could be eliminated through upgrades at Forest Junction that ATC could carry out as part of its planned Forest Junction upgrade project. The study also found that, in addition to the two new 345/138 kV transformers that would be installed as part of the planned upgrade project, a third transformer would be required to alleviate overloads that could result from operation of the proposed Fox Energy plant.

If the Fox Energy plant were interconnected as in the No-Loop option, no additional upgrades, beyond those described in the previous paragraph, would be required. If the plant were interconnected as in the Loop option, a number of minor upgrades would be required to alleviate thermal overloads. These include a number of upgrades to substation equipment and work to increase vertical clearances on a total of 15 spans of two transmission lines. Clearances can be increased by increasing the height or the tension of the conductors. Some structures might be made taller or replaced with taller structures. According to ATC, the Loop option would provide three connections for the power plant, reducing the likelihood of interconnection failure.

WEPCO's dynamic stability study concluded that either of the proposed interconnection options should yield satisfactory dynamic stability performance without any additional upgrades. The study did recommend, however, that each Fox Energy generator include a certain kind of control system known as a power system stabilizer (PSS), which would give even greater assurance that dynamic stability would not be degraded by addition of new generation. It is likely that Fox Energy could arrange to have any new generator equipped with a PSS, which is a fairly common feature on new generators that should not have a significant impact on overall project costs.

New Transmission Line Construction

If the Commission authorizes the generation and transmission facilities included in the Fox Energy project, and Fox Energy proceeds with construction of the power plant, ATC would build the required transmission facilities. ATC would use the routes and line designs approved by the Commission. Fox Energy proposed specific routes and designs in its CPCN application. Structure designs, routes, pertinent agreements, and costs are discussed here. Expected construction methods are discussed in the section on transmission under "Auxiliary Facilities" in Chapter 2.

Structure types

Figures 5-2 to 5-6 depict the types of transmission structures that ATC proposes to use for new transmission construction. In general, different structure types are required at different locations along a transmission line. Along straight sections of line, "tangent" structures are generally used. These structures are capable of supporting the weight of the conductors, but do not have to resist large lateral (side-to-side) forces. In contrast, at points where the transmission line changes direction, "angle" structures must be used, which are capable of resisting significant lateral forces associated with the tension of the transmission line conductors. Angle structures may be classified as light angle or heavy angle structures, depending on the magnitude of the change in direction at the structure and the associated lateral forces. So-called "deadend" structures are similar to heavy angle structures. A deadend structure is capable of resisting the tension of transmission line conductors that terminate at the structure. Deadend structures may be used even in the middle of a long straight section of transmission line so as to limit the extent of domino-effect failure of transmission line structures. New straight-line sections associated with the Fox Energy project are shorter than six miles and, thus, do not require deadend structures in the middle.

Figure 5-2 depicts a typical wood H-frame tangent structure of the type that ATC proposes to use for straight sections of new transmission line.

Figure 5-2 Typical wood H-frame tangent structure

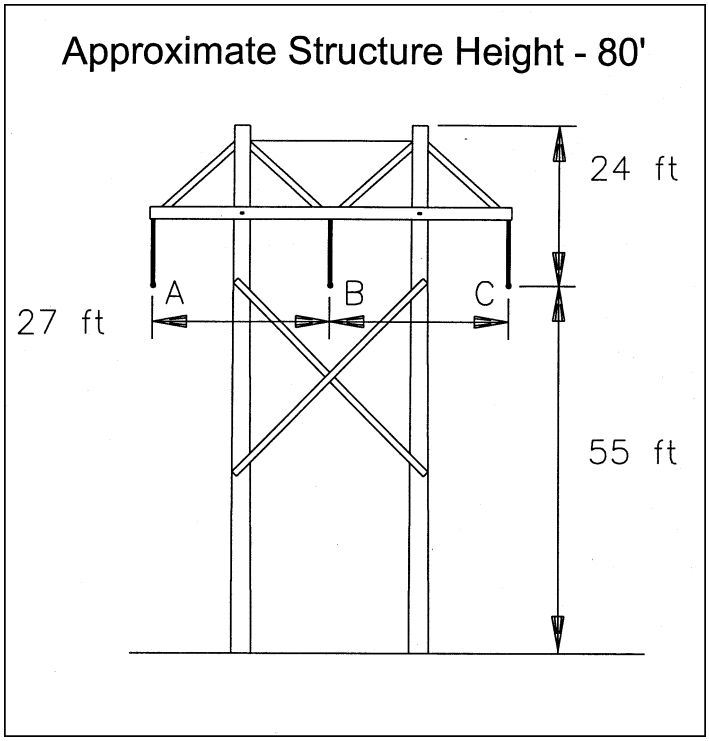


Figure 5-3 shows the structures in the existing transmission corridor where the 138 kV and 345 kV lines parallel one another (the 345 kV line is on the left). The 345 kV line structures in this picture are similar to the wood H-frame tangent structures that ATC proposes to use. If a new 345 kV circuit were to be constructed along this part of the existing transmission line ROW, ATC proposes that the wood H-frame structures used to support the 138 kV line would be replaced with double-circuit steel structures. These structures would support the existing 138 kV circuit on one side and the new 345 kV circuit on the other. This would minimize the amount of new ROW that would be required, but the new structures would be significantly taller than the existing structures.

Figure 5-4 depicts this situation. On the left side of this figure is the existing PBNA 345 kV line, supported by wood H-frame structures. On the right is a double-circuit transmission line supported on new steel structures.

Figure 5-3 View from the proposed Freedom site facing west/northwest along the existing transmission line ROW

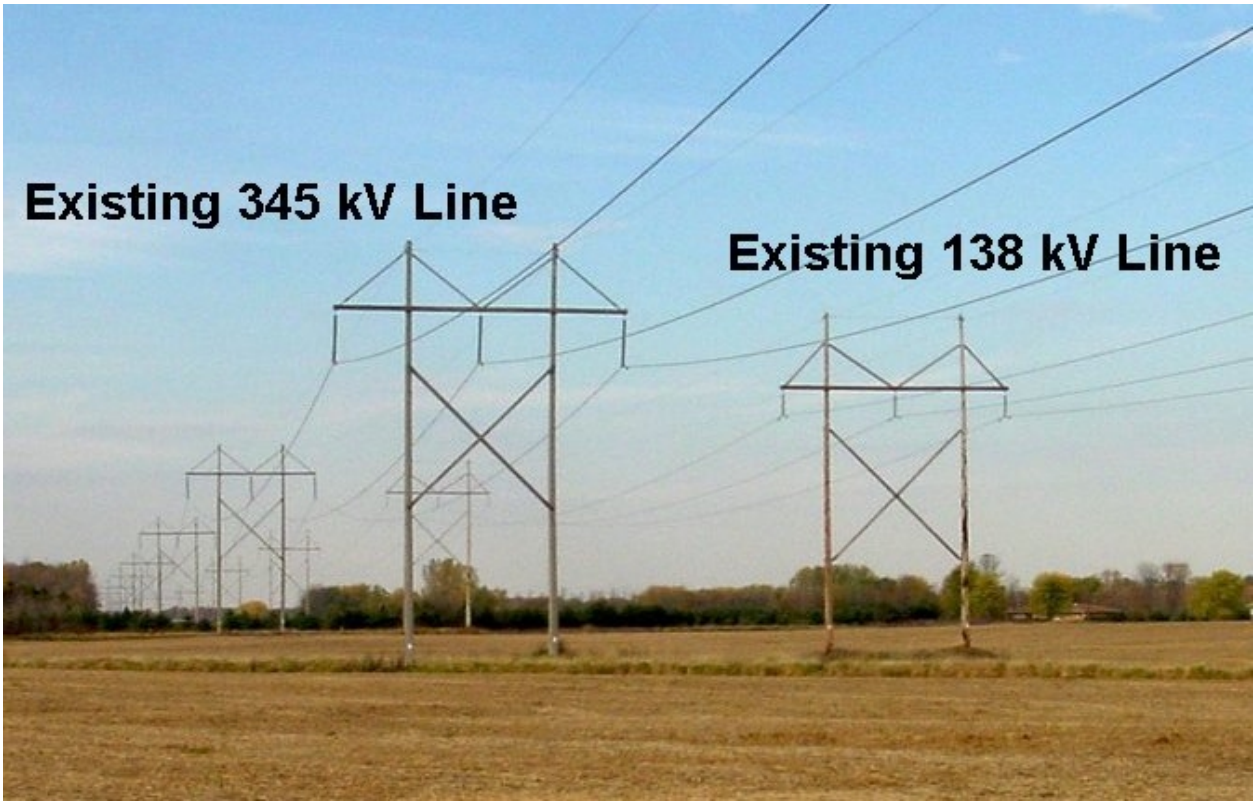


Figure 5-4 Existing wood H-frame structure next to new steel double-circuit structure

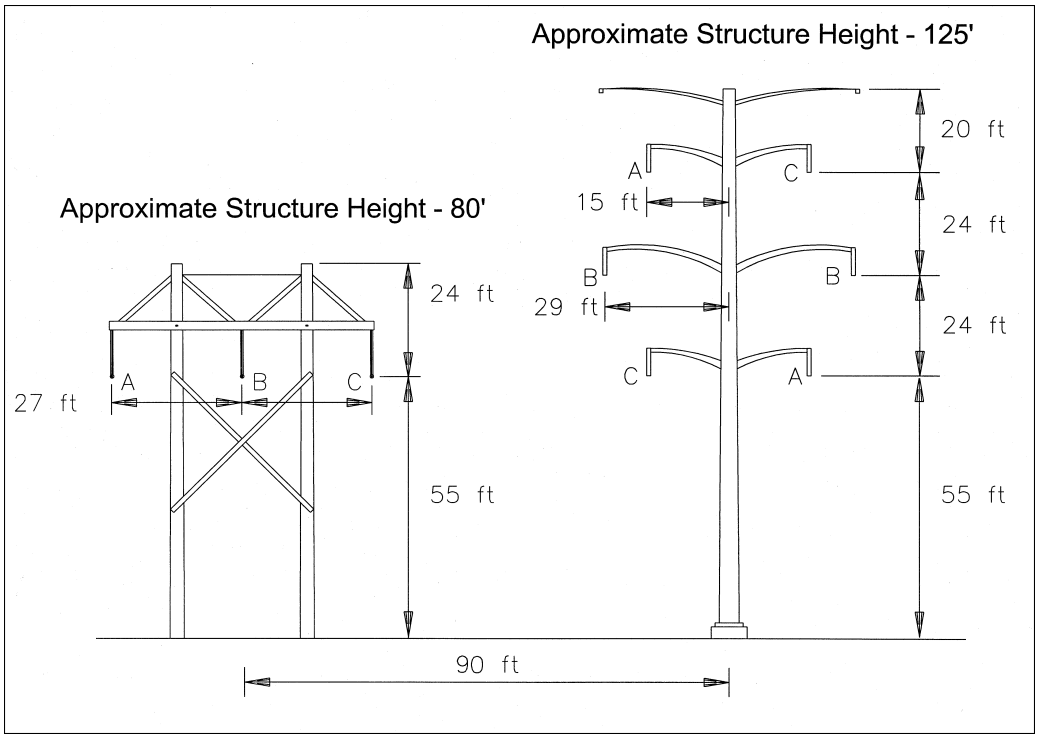


Figure 5-5 depicts a typical guyed three-pole light angle structure made of wood. ATC proposes to use structures such as these for changes in direction of approximately 15 degrees or less. Figure 5-6 depicts a self-supporting steel lattice heavy angle structure of the type that ATC proposes to use for changes in direction larger than approximately 15 degrees.

Figure 5-5 Typical guyed three-pole wood light-angle structure

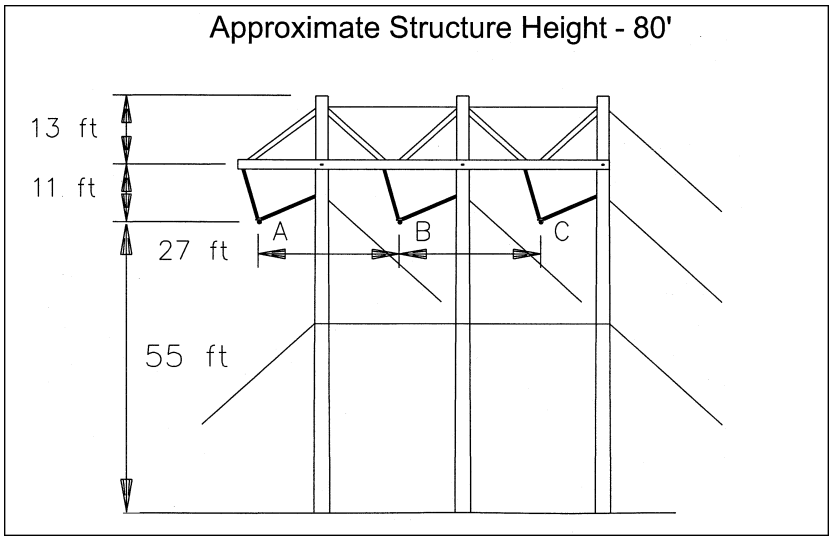


Figure 5-6 Lattice steel heavy-angle or deadend structure

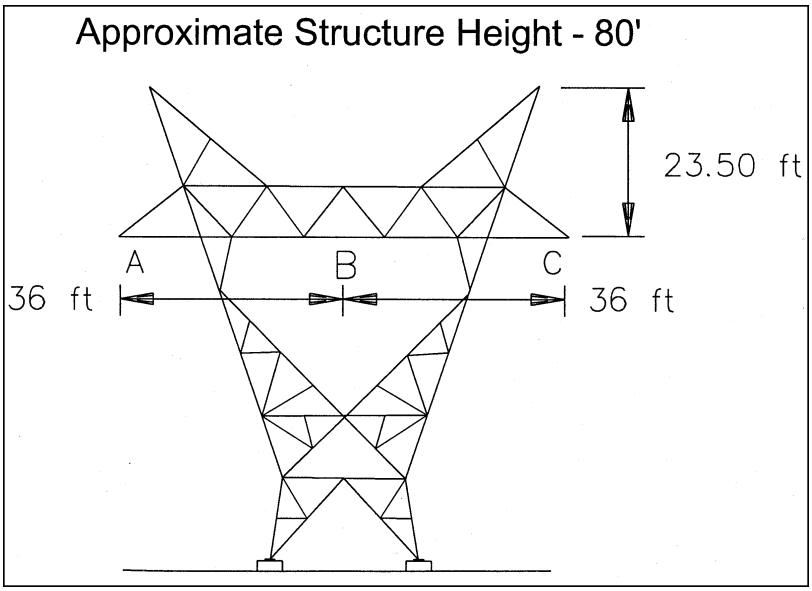
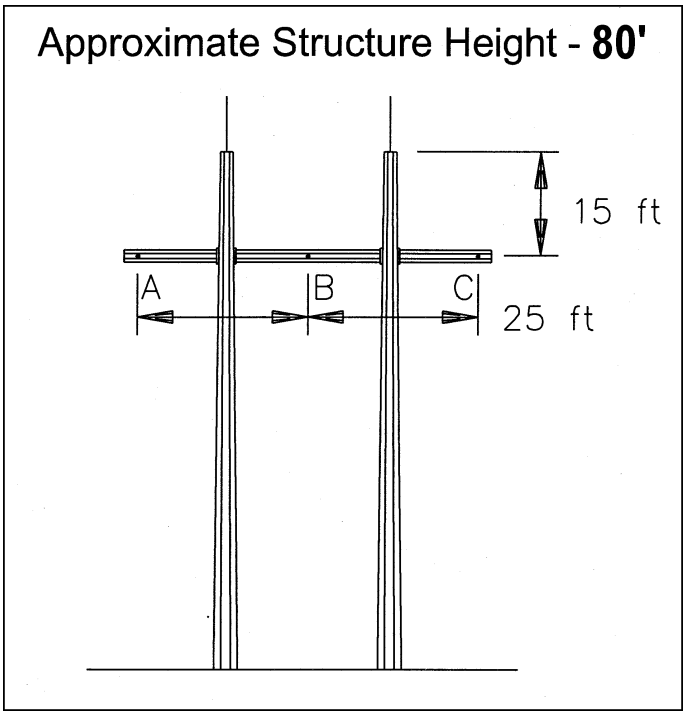


Figure 5-7 depicts a steel structure of the type that would be used within the plant property boundary.

Figure 5-7 Steel H-frame deadend structure at power plant switchyard



Proposed transmission routes

Each of the transmission "solutions" (Loop and No-Loop) for connecting the new power plant to the transmission system has two routing options. The options are: 1) using existing transmission line ROW and building the new line on new single-circuit structures parallel to the existing line where only one line presently exists, or building the new line on new double-circuit structures with one of the existing lines where two parallel lines presently exist; or 2) constructing a new single-circuit transmission line on mostly new ROW.

Figure 5-1 shows the existing transmission lines in the project area. Figures 5-8 and 5-9 show the two types of routing options to connect each proposed site to the North Appleton Substation and the Forest Junction Substation area.

Loop solution - Existing ROW Route

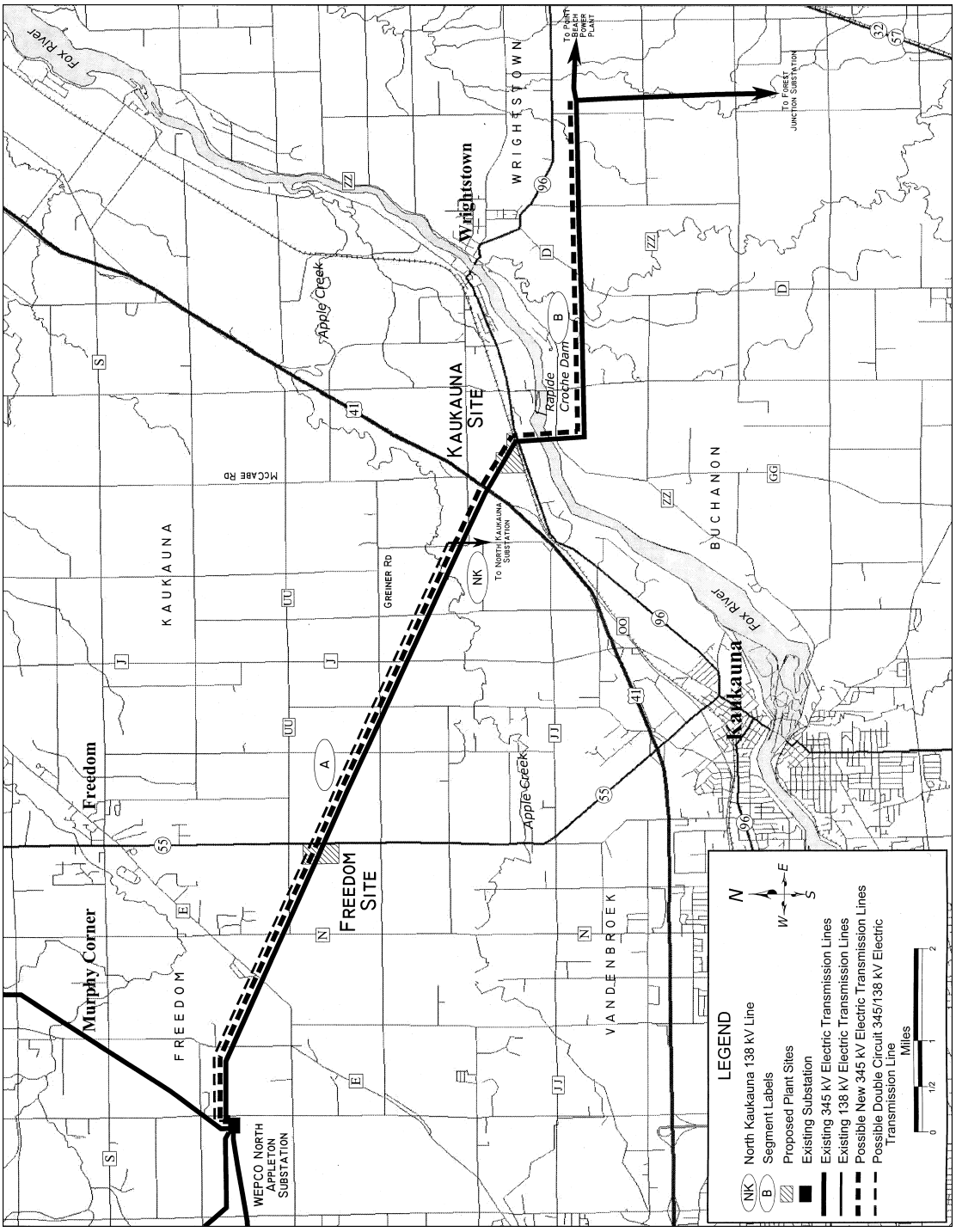
The loop solution would loop the proposed power plant into the existing PBNA 345 kV transmission line and construct a new transmission line to the DEFJ 345 kV line in the town of Wrightstown in Brown County. This routing option uses existing transmission line ROW for its entire length (Figure 5-8). No additional ROW would likely be needed, but easement contracts with landowners under the line might need to be renegotiated.

Freedom connection

The proposed Freedom site would require a longer length of new transmission line construction under the Loop solution than the Kaukauna site. The proposed facility would be looped into the existing PBNA line at the site to complete the North Appleton substation connection. A new switchyard or substation would be constructed adjacent to the line where the line crosses the plant site. The new 345 kV transmission line from the Freedom site to the DEFJ line would be built parallel, and directly adjacent, to the existing PBNA 345 kV line.

This new line, approximately nine miles in length, would be built on the north side of the existing PBNA line. The PBNA 345 kV line and the existing Kaukauna Substation 138 kV line (KKSS) share a ROW for approximately four miles between the Freedom site and where the KKSS 138 kV line heads south to the Kaukauna Substation. The four-mile length of 138 kV line would be dismantled and rebuilt as a double-circuit facility that would accommodate the existing 138 kV line and a new 345 kV line (see Figures 5-3 and 5-4). East of where the KKSS line leaves the ROW, the new 345 kV line would continue approximately five miles to the DEFJ line. It would cross the Fox River next to the existing PBNA line just upstream from the Rapide Croche Dam. South of the Fox River crossing, the new 345 kV line would turn eastward parallel with the existing PBNA line to the DEFJ line connection.

Figure 5-8 **Proposed "Existing ROW" transmission line routing between the Forest Junction area and the North Appleton Substation**



Kaukauna connection

The proposed Kaukauna site switchyard would be built adjacent to the existing PBNA line, which also passes through this site. The Kaukauna connection would be similar to the Freedom connection in that it would loop into the PBNA line at the site to complete the North Appleton connection. It would connect to the Forest Junction area via a newly constructed 345 kV transmission line built parallel, and directly adjacent, to the PBNA line from the Kaukauna site south and then east to the DEFJ line. The new line, approximately five miles long, would be built on the north side of the PBNA line and would probably be entirely within the existing ROW.

Loop solution - New ROW Route

The loop solution New-ROW Route includes looping the proposed power plant into the existing PBNA line and constructing a new transmission line on mostly new ROW to connect the plant to the DEFJ line leading to the Forest Junction Substation (see Figure 5-9). Each of the proposed site connections is discussed in more detail below.

Freedom connection

The proposed Freedom site would again require the greatest amount of new construction under this transmission connection scenario. Similar to the Existing ROW Route discussed above, this transmission routing proposal would include looping the Freedom site into the existing PBNA 345 kV line at the Freedom site to connect to the North Appleton Substation. The connection to the DEFJ line would require the construction of approximately 13 miles of new 345 kV line.

The new 345 kV line route would extend north from the site for approximately 0.5 miles along STH 55. From that point, the line would extend eastward, cross-country for approximately 3.5 miles, then southward cross-country between Section Line Road and McCabe Road for approximately 2.0 miles to the existing PBNA line at Wrightstown Road. From there, the new line would extend approximately one mile to the southeast within the existing 345 kV ROW, crossing the Fox River and continuing south to the location where the PBNA line turns east. From this point, the new 345 kV line would continue south in a new ROW approximately 1.4 miles, turn east, and continue approximately four miles to the existing DEFJ line. The total length of this proposed Freedom site to Forest Junction transmission route is approximately 13 miles. It would require the acquisition and development of approximately 11 miles of new ROW.

Kaukauna connection

Similar to the Kaukauna connection by the Existing ROW Route, this connection would include an on-site loop into the PBNA 345 kV line to connect the plant to the North Appleton Substation. The connection to the Forest Junction Substation area would require the construction of approximately six miles of new 345 kV transmission line from the Kaukauna site to the existing DEFJ 345 kV line.

The Kaukauna to Forest Junction transmission connection route would travel south from the site in the existing PBNA 345 kV ROW, cross the Fox River, and continue south for approximately one mile to the point where the PBNA line turns east. At this point, the new

345 kV line would continue southward approximately two miles in a new ROW, then turn east and continue approximately four miles to the existing DEFJ line. This portion of the new transmission route would be the same as the corresponding route described for the Freedom connection. It would require the acquisition and development of approximately five miles of new ROW.

No-Loop solution - Existing ROW Route

The No-Loop connection solution would not include any on-site connection loop into the existing PBNA 345 kV transmission line. It would require new construction to connect to the North Appleton Substation directly and to the DEFJ line terminating at the Forest Junction Substation. Under this transmission routing option, new 345 kV line would be built entirely in existing ROW (see Figure 5-8). Either power plant site must be connected by new line to both the DEFJ line (and the Forest Junction Substation) and the North Appleton Substation.

Freedom connection

The Freedom site would be connected to the North Appleton and Forest Junction substations via newly constructed 345 kV transmission lines within the existing KKSS 138 kV and PBNA 345 kV ROW. The North Appleton connection would require the new 345 kV line to be built in a double circuit configuration with the existing KKSS 138 kV transmission line that crosses the site. The 138 kV line would be dismantled and rebuilt as a double circuit facility accommodating both the existing 138 kV line and the new 345 kV line. This new 138 kV /345 kV transmission line would be built parallel, and directly adjacent, to the north side of the existing PBNA 345 kV line from the Freedom site westward to the North Appleton substation. The route would cover approximately three miles.

The Freedom site to Forest Junction connection at the DEFJ line would be the same routing alternative discussed earlier under "Loop Solution - Existing ROW Route."

Kaukauna connection

The Kaukauna site would also be connected to the North Appleton Substation and the Forest Junction Substation directly via new 345 kV transmission lines within the existing transmission ROW.

The 345 kV North Appleton connection would be built parallel and directly adjacent to the existing 345 kV line. Proceeding northwest from the site, the two 345 kV lines would be parallel for approximately one mile to the point where the existing KKSS 138 kV line joins the ROW from the south. The proposed Fox-North Appleton 345 kV line would have to be built in a double circuit configuration with the 138 kV line for the seven-mile distance to the North Appleton Substation. As discussed previously, the existing KKSS 138 kV line would need to be dismantled and rebuilt to the double circuit configuration. The new transmission line route would cover a total of approximately eight miles and would be entirely within existing ROW.

The Kaukauna site would also be connected to the Forest Junction Substation via a newly constructed 345 kV transmission line to the DEFJ. This portion of the line would be built parallel, and directly adjacent, to the existing PBNA 345 kV line in existing ROW from the

Kaukauna site to the connection with the DEFJ line leading south to the Forest Junction Substation. The total length of the new line would be approximately five miles.

No-Loop solution - New ROW Route

The no-loop connection solution would again not include any on-site loop to the existing PBNA 345 kV line. It would require new 345 kV line construction that would connect the proposed power plant to the North Appleton Substation and DEFJ line. Under this transmission routing option, a new 345 kV transmission line would be built in new ROW for nearly its entire length (see Figure 5-9).

Freedom connection

The direct connection to the North Appleton Substation would require a new 345 kV line that would extend north from the facility approximately 0.5 miles, westward for two miles and cross over the existing PBNA 345 kV and KKSS 138 kV lines at one point. At the two-mile mark, it would turn north for 0.5 miles and run parallel to the existing lines westward for 0.6 miles to the North Appleton Substation in the existing ROW. The last 0.6 miles would require configuration of the new 345 kV line and the existing KKSS 138 kV line as a double circuit. Approximately three miles of new ROW would need to be acquired and developed for this route.

The proposed Freedom site to Forest Junction connection would be identical to the Forest Junction connection discussed in detail under "Loop solution - New ROW Route." About 13 miles of new ROW would be required for this connection.

Kaukauna connection

The Kaukauna site's connection to the North Appleton Substation would extend northwest from the site parallel, and directly adjacent, to the existing 345 kV line in the existing ROW for approximately 0.6 miles. At this point, the new 345 kV line would leave the existing ROW, turn north, for approximately two miles, then west for six miles, crossing over the existing 345 kV and KKSS 138 kV lines at a point east of the North Appleton Substation. The new line would then turn northward for 0.5 miles and run parallel to the existing 345 kV and 138 kV lines, turning westward and continuing approximately 0.6 miles within the existing ROW to the North Appleton Substation. The last 0.6 miles would require construction of the new 345 kV line and the existing 138 kV line as a double circuit. Approximately nine miles of new ROW would need to be acquired and developed for this route.

The Forest Junction connection, requiring about five miles of new ROW, would be identical to the Forest Junction New ROW Route connection discussed above under "Loop solution - New ROW Route."

Pertinent agreements needed

Fox Energy and ATC must negotiate an interconnection agreement. Fox Energy and ATC entered into this agreement on February 2, 2002. The interconnection study was perhaps the most important step in the process leading to such an agreement. This agreement specifies the system improvements that are necessary to accommodate the proposed plant and the extent to

which Fox Energy must bear those costs. The agreement also specifies the terms of interconnected operation for the proposed plant.

In addition to this interconnection agreement, Fox Energy would probably have to obtain reservations for the use of the transmission system in order to deliver its power output to customers. (These reservations could also be obtained by the customers.) This would also require that studies be performed. These studies would be distinct from the interconnection studies already conducted. Moreover, the interconnection studies do not, by themselves, provide any guarantee that Fox Energy will be able to obtain transmission service. However, the interconnection studies did consider a range of possibilities for where Fox Energy might sell its output. The results of this study strongly suggest that Fox Energy should be able to obtain reservations to sell power in this region.

Costs

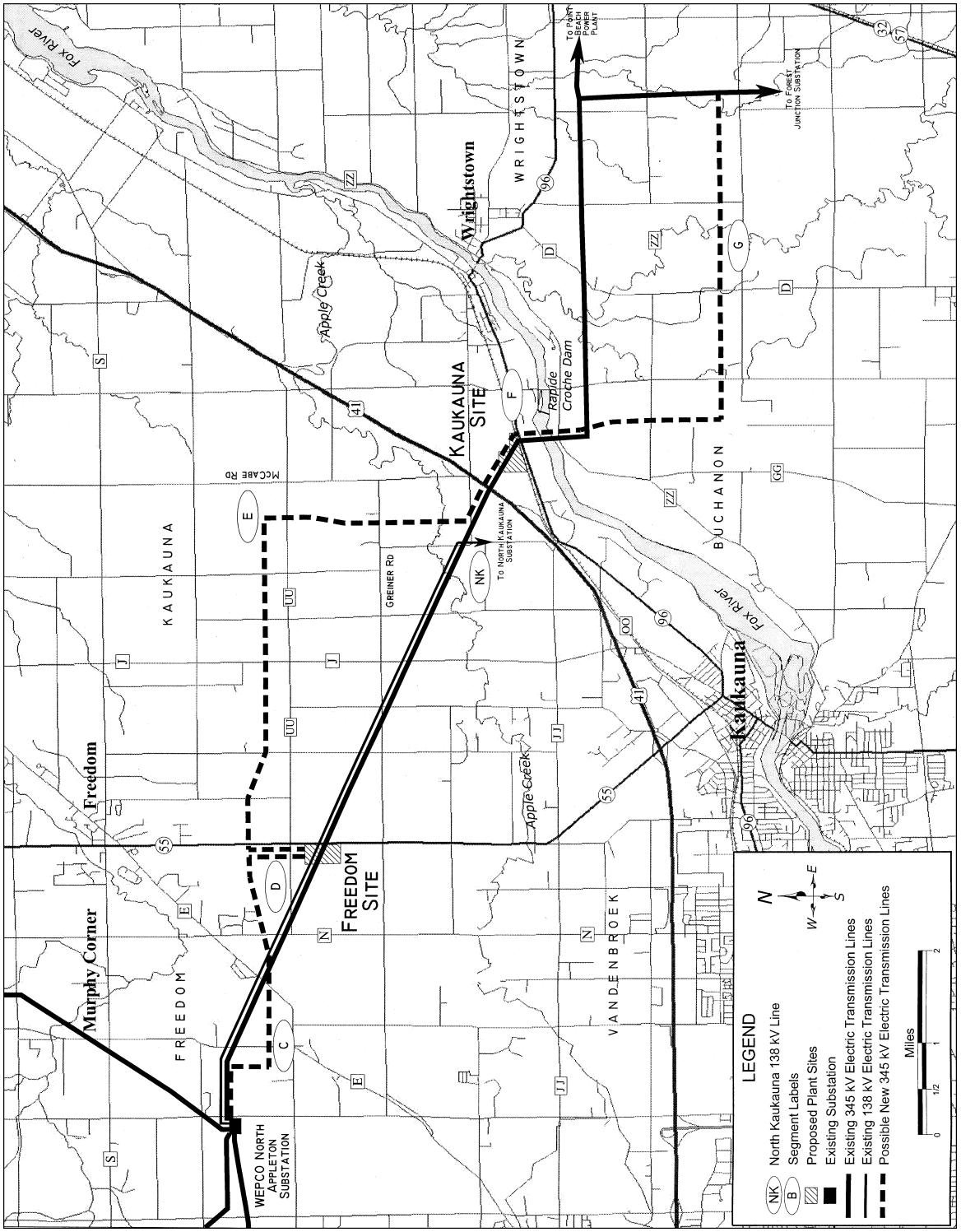
The cost of interconnecting the proposed plant to the transmission system depends on the power plant site, the transmission interconnection approach adopted, and the specific transmission line route that is selected. In general, Fox Energy would pay for upgrades required to interconnect the proposed plant, but the new facilities would become part of ATC-owned transmission system.

The total cost can be broken into three distinct parts: the cost of the electrical switchyard at the plant site, the cost of new transmission lines required to connect the proposed plant to other transmission substations, and the cost of transmission upgrades – other than the new transmission lines – that would be required to accommodate the new Fox Energy plant. The switchyard cost differs between the two interconnection approaches because the plant would be connected to three transmission line segments in the "Loop" case and only two in the "No-Loop" case. Table 5-1 shows these costs (expressed in millions of dollars). ATC reviewed these cost estimates and found them to be accurate.

Table 5-1 Transmission interconnection costs

	Site							
	Freedom				**Kaukauna**			
Interconnection Approach	**Loop**		**No-Loop**		**Loop**		**No-Loop**	
Transmission line route	Existing ROW Route	New ROW Route	Existing ROW Route	New ROW Route	Existing ROW Route	New ROW Route	Existing ROW Route	New ROW Route
Cost – switchyard	$6.3 M	$6.3 M	$5.1 M	$5.1 M	$6.3 M	$6.3 M	$5.1 M	$5.1 M
Cost – new transmission	$7.8 M	$11.4 M	$11.5	$14 M	$4.3 M	$6.9 M	$11.5 M	$13.2 M
Cost – other upgrades	$3.2 M	$3.2 M	$3.0 M	$3.0 M	$3.2 M	$3.2 M	$3.0 M	$3.0 M
Total cost	$17.3 M	$20.9 M	$19.6 M	$22.1 M	$13.8 M	$16.4 M	$19.6 M	$21.3 M

Figure 5-9 **Proposed "New ROW" transmission line routing between the Forest Junction area and the North Appleton Substation**



Environmental Factors – Existing ROW Route

To avoid repetitive description of common route segments, the entire North Appleton to Forest Junction connection via existing ROW will be discussed geographically as one route. Individual segments will be referred to when discussing specific impacts along the route (see Figure 5-8). It is also important to note that the route alternatives within the existing ROW could also include on-site line looping discussed in the previous section. The following sections of text and illustrations describe potential impacts to the natural and local community resources that could result from new transmission line construction.

Existing natural resources and potential impacts

Soils and geology

The major soil associations along the Existing ROW Route include the Winneconne-Manawa association and the Shiocton-Nichols association.[20] Soils that make up these associations include several silty loams and silty clay loams such as Kewaunee silt loam, Winneconne silty clay loam, Manistee fine sandy loam and Poygan silty clay loam. These associations are used predominantly for cultivated crops or pasture and are noted for having severe limitations for non-farm uses, such as rural home development or structures needing shallow foundations. These soils generally have medium erodibility values as well, indicating their potential for erosion during and after construction. New transmission line construction on these soils could cause significant erosion and compaction if construction site BMPs were not implemented. Construction activities for new transmission lines would include excavation or auguring for transmission tower construction, the operation of heavy equipment in the existing ROW to string new lines, and the transportation of equipment in and out of the ROW.

Vegetation and wildlife

The route was screened for the presence of threatened and endangered plant and animal species. According to the NHI records, no threatened or endangered species have been identified. It is reasonable to assume that no impacts to threatened and endangered species would result from new transmission line construction.

The construction of new transmission lines could affect existing vegetation and wildlife resources. With the exception of some small stands of trees and pockets of woods, most of the landscape along the Existing ROW Route is utilized for crops or pasture. Major vegetation types encountered along the Existing ROW Route include several tree and shrub species such as box elder, silver maple, green ash, and staghorn sumac. Major agricultural crops along this same route include corn, soybeans, alfalfa, and other dairy-related production. Wildlife species that inhabit these areas include white-tailed deer, raccoons and rabbits. Bird species that inhabit this

[20] Soil Survey of Outagamie County, Wisconsin. 1978. United States Department of Agriculture-Soil Conservation Service.

landscape include the cedar waxwing, American robin and red-winged blackbird. Additionally, tadpoles and frogs are likely to inhabit wet areas and small pools in and around drainage areas, tributaries and local creeks, streams and wetlands.

Potential impacts to vegetation and wildlife along the ROW would probably be minimized because there are no large areas of contiguous habitat, i.e. large acreages of trees and large wetland complexes, in the project area. Since this proposed route follows existing ROW, no new clearing would occur. Construction equipment passing in and out of the ROW could, however, introduce undesirable nuisance plant species that could spread throughout the disturbed ROW corridor.

Based on preliminary designs of the transmission facilities, it is possible that migrating waterfowl and other migratory avian species could be impacted by changing the configuration of the transmission lines along Segment A (see Figure 5-8). As discussed in a previous section of this final EIS, some transmission routing alternatives would require the 138 kV line to be rebuilt to a 138 kV/345 kV double circuit configuration. The new configuration would introduce a taller barrier across the landscape than currently exists along Segment A (see Figures 5-3 and 5-4). Impacts could occur because migrating birds and waterfowl that have flown this area in the past would not be accustomed to navigating new barriers. Mitigating these impacts could be accomplished by the continued use of parallel single-circuit transmission lines or the installation of bird flight diverters.

Water resources and wetlands

The Existing ROW Route crosses several water resources and wetlands along its path. Two wetlands could be impacted; one located along Segment A and another located along Segment B. The wetland on Segment A is less than two acres in size and a detailed inventory for this wetland is not available. A more detailed analysis of the wetland could be conducted if this route segment were selected. The wetland on Segment B is northwest of the proposed Kaukauna site, north of USH 41. This wetland is identified on the WWI as a mixed wetland with two distinct characters; one portion is identified as forested with broad-leaf deciduous trees and the other portion is identified as a scrub shrub wetland with deciduous broad-leaf shrubs and wet meadow species.

If a new transmission line could span these wetlands, without placing transmission poles within the wetlands, it is unlikely that impacts would occur. If transmission poles were installed within the boundaries of either wetland, permits would be needed from the ACOE and the DNR. These agencies would review proposed construction practices within and around the wetland and would also consider the water quality of the wetland to prevent erosion material from construction to fill the wetland or nearby bodies of water. Transmission structure placement could be altered to avoid these sensitive areas if impacts were deemed significant or securing permits proved unsuccessful.

In addition to these wetlands, several surface waters are crossed by the Existing ROW Route. Starting from the North Appleton substation, the Existing ROW Route crosses tributaries to Duck Creek, Apple Creek, and tributaries to Apple Creek as it moves southeast towards the

proposed Kaukauna site. The Fox River, Plum Creek and the East River are crossed as the ROW heads south and east to Forest Junction. The impacts of the current and proposed lines on these resources would likely not increase. New impacts could occur however, if new transmission line structures were placed in or around any of the water bodies described above. Permits from the ACOE and the DNR would be required if work were to be done in and around a waterway and impacts to water quality were expected. Mitigation could include the re-design of transmission routes and facilities to avoid sensitive areas, although countervailing factors could affect whether a change in route were used.

Local community resources and potential impacts

Consistency with current and planned land use

According to local records, the land use along the proposed transmission line route has been active agriculture since the 1800s. The existing PBNA 345 kV transmission line has been a fixture on the landscape since 1965.

Based on local land use planning documents, land along the Existing ROW Route is zoned agriculture. The current land use plans that cover Freedom and Kaukauna discuss preventing building development such as homes and businesses at the expense of prime agricultural land. Public utility installations are listed as "Permitted Accessory Uses and Structures" under the Outagamie County Zoning Ordinance. It would appear that building a new transmission line would not cause a major conflict with current and future land use in this region where several transmission lines currently exist.

Agriculture and other land use issues

Potential impacts in general

In terms of agricultural impact, several issues arise with the proposed new transmission lines. The existing 345 kV-138 kV lines along Segment A are built so that the transmission poles for each line are side-by-side. This allows farmers to adjust cropping and harvesting patterns around one fixed point. The towers result in a footprint on the field where there are no crops at the base of the poles and planting and harvesting are done to avoid this small area. If the new poles and the existing 345 kV poles were not situated side-by-side, a farmer would have to adjust practices around structures in more than one crop row. If a new 345 kV line were built between North Appleton and Forest Junction, it would be beneficial to build the structures in line with the existing 345 kV structures to avoid forcing farmers to reconfigure their crop and harvest patterns. Other agricultural impacts that could occur from new line construction include taking portions of fields out of production during construction, interfering with irrigation or spraying patterns, and disturbing drain tile networks. In order to mitigate impacts, construction could be done in the months when crops are not present or when fields are frozen. Transmission structures could be moved within the ROW to be as close to field edges as practicable.

Concerns expressed by landowners

A number of concerns were raised regarding the proposed transmission construction after ATC-sponsored public meetings and comment period on the original draft EIS.

Structure configuration

Among the concerns voiced by many landowners was the potential for installation of new transmission line structures to interfere with farming operations. Some of the commenters indicated dissatisfaction with the transmission construction configurations proposed by ATC.

Landowners expressed a preference that ATC use single-pole structures for the new 345 kV line. Going one step further, some expressed a preference for double-circuiting the new circuit with the existing circuit, where a route adjacent to the existing circuit is selected, and installing these new double-circuit structures in the alignment of the existing transmission line. Generally, ATC has proposed to use wooden H-frame structures for new 345 kV circuits, as depicted in Figure 5-2. (The one exception is the case of a new 345 kV circuit installed adjacent to the existing North Appleton-Kaukauna North 138 kV circuit, for which ATC proposes to use new single-pole steel double-circuit structures to support both circuits, as depicted in Figure 5-4.)

In response, ATC has indicated its own preference to use H-frame structures rather than single-pole structures because they would be less expensive. It indicates a preference not to replace the existing 345 kV circuit with a new double-circuit line because this would require removing this circuit from service during construction, which could impact reliability and the utilities' ability to schedule their generation in the most economical way. In addition, ATC says that its existing easements along the PBNA 345 kV line, which specify that they allow construction of a second adjacent 345 kV transmission line at a future date, would have to be renegotiated to allow double-circuit structures to be installed.

On the other hand, ATC has stated that it might be possible to intersperse certain single-pole and H-frame structures. For example, it might be possible to install two-pole H-frame structures along property lines or between fields, while using some type of single-pole structure within fields.

The feasibility of alternatives to the transmission structure proposal in the application is illustrated in the summarized costs per mile in Table 5-2.

Table 5-2 Estimated construction cost for proposed 345 kV line design and alternatives

Line Design	Cost per mile
Wood two-pole (H-frame) single-circuit	$270,082
Tubular steel single-pole single-circuit	$433,725
Tubular steel single-pole double-circuit	$812,228

Landowner rights versus existing easements

The other main issue raised by landowners concerns the existing easements for the PBNA 345 kV line. As noted above, the existing easements give ATC the right to construct an additional 345 kV transmission line alongside the existing line, and thus no easement modification would be required to allow the new line to be installed along these route segments.

These easements date from the construction of parts of the existing PBNA line in the mid-1960s.

In contrast, in accordance with changes in state law dating from the 1970s, new transmission line easements now automatically contain provisions giving landowners additional rights, unless the landowner waives these rights. These rights are itemized in Wis. Stat. §§ 182.017(7)c-h, as follows:

1. In constructing and maintaining high-voltage transmission lines on the property covered by the easement the utility shall:
    a) If excavation is necessary, ensure that the top soil is stripped, piled and replaced upon completion of the operation.
    b) Restore to its original condition any slope, terrace, or waterway which is disturbed by the construction or maintenance.
    c) Insofar as is practicable and when the landowner requests, schedule any construction work in an area used for agricultural production at times when the ground is frozen in order to prevent or reduce soil compaction.
    d) Clear all debris and remove all stones and rocks resulting from construction activity upon completion of construction.
    e) Satisfactorily repair to its original condition any fence damaged as a result of construction or maintenance operations. If cutting a fence is necessary, a temporary gate shall be installed. Any such gate shall be left in place at the landowner's request.
    f) Repair any drainage tile line within the easement damaged by such construction or maintenance.
    g) Pay for any crop damage caused by such construction or maintenance.
    h) Supply and install any necessary grounding of a landowner's fences, machinery or buildings.

2. The utility shall control weeds and brush around the transmission line facilities. No herbicidal chemicals may be used for weed and brush control without the express written consent of the landowner. If weed and brush control is undertaken by the landowner under an agreement with the utility, the landowner shall receive from the utility a reasonable amount for such services.
3. The landowner shall be afforded a reasonable time prior to commencement of construction to harvest any trees located within the easement boundaries, and if the landowner fails to do so, the landowner shall nevertheless retain title to all trees cut by the utility.
4. The landowner shall not be responsible for any injury to persons or property caused by the design, construction or upkeep of the high-voltage transmission lines or towers.

5. The utility shall employ all reasonable measures to ensure that the landowner's television and radio reception is not adversely affected by the high-voltage transmission lines.
6. The utility may not use any lands beyond the boundaries of the easement for any purpose, including ingress to and egress from the right-of-way, without the written consent of the landowner.

If the Commission were to approve a transmission line route that involved construction of new transmission in the existing transmission line ROW, the Commission could consider including provisions in its order that grant some or all of these rights to the affected landowners.

Proximity to residences and businesses

Another local community impact to consider is the proximity of residences and businesses to the lines. Potential impacts could include property devaluation, fear of health risks, unsightliness of the lines, and physical impacts to landscaping. Table 5-3 illustrates how many and what kind of structures exist along each of the proposed transmission route segments.

Table 5-3 Proposed transmission line distances to residences and commercial structures

Route and Segments	0-25 feet	25-50 feet	50-100 feet	100-150 feet	150-300 feet
Existing ROW Route Segment A	0	0	1-Commercial	0	2-Commercial 8-Residences
Existing ROW Route Segment B	0	0	1-Residence	0	5-Residences

Roads, railroads and other utilities

Several roads, a railroad corridor, existing transmission lines, and two underground natural gas distribution lines would have to be crossed to construct the new transmission line. Larger transmission line structures might be needed to gain necessary vertical clearance. ATC would have to consult with the DOT, the Wisconsin Central Railroad, and ANR about these crossings. The roads and highways crossed by the Existing ROW Route between North Appleton and Forest Junction are listed on the following page:

Bodde Road	CTH D
Elmro Road	CTH E
Farrell Road	CTH J
French Road	CTH N
Greiner Road	CTH U
Maloney Road	CTH ZZ
Shanty Road	STH 55
Weyers Road	STH 96
Wrightstown Road	USH 41
CTH C	Wisconsin Central Limited RR

Visual landscape

The visual landscape along the proposed transmission corridor could possibly change significantly from its current state. The selection of transmission facility structures would dictate how significant the impact would be on the existing visual landscape. As discussed earlier, the structures vary in height and in the materials and finishes.

Noise

Noise impacts are a possible result from the construction of new transmission lines. Besides the construction noise, noise from operating 345 kV transmission lines usually takes four forms: a sizzle, a crackle, a hiss and a low frequency hum. The sizzle, crackle, or hiss noises are caused by a phenomenon known as "corona" and occur most often during periods of high relative humidity or rain. The humming noise most often is noticeable on older lines, and is usually the result of conductor hardware that has loosened very slightly over the years. The new lines that would be built in the existing ROW would not likely contribute additional noise to that which may already exist during wet weather. There would be temporary noise introduced from heavy equipment during line construction activities.

Historical and archeological sites

In accordance with Wis. Stat. § 44.40, a data search was done to identify the presence or absence of any historical or archeological sites that could be adversely affected by new transmission line construction. According to the WHS, no known historic or archeological sites would be adversely affected by any of the proposed new transmission lines built within the Existing ROW Route.

Because of the federal permits and approvals required for the plant, Fox Energy or ATC compliance with Section 106 of the NHPA might also be necessary. Depending on WHS

determinations, compliance might involve field surveys along portions of the Existing ROW route that have not yet been field surveyed or disturbed to a depth of four feet.

Environmental Factors – New ROW Route

Existing natural resources and potential impacts

Soils and geology

Soil composition and geology of the proposed line are similar to the soils and geology of the lands along the Existing ROW Route, discussed in the previous section. Erosion or compaction of soils could be concerns during construction.

Vegetation and wildlife

Agricultural, forest, and wetland vegetative communities have been identified along the route.

Most of the agricultural lands along the route are currently being cultivated in row crops such as corn and soybeans, as well as pasture crops such as alfalfa. Forest plant species identified along the proposed route include red ash, silver maple, boxelder, aspen *(Populus tremuloides)* and others. Wetlands found along the route support small stands of broad-leaved deciduous trees.

On segment E, the line would pass through 845 feet of woodland and require clearing of a total of about three acres of trees.

Typical wildlife found along the new transmission route includes white-tailed deer, raccoons, rabbits, chipmunks, frogs and squirrels. Birds such as cedar waxwing, robins, sparrows, mourning doves, meadowlarks, cardinals, blue jays, red-winged blackbirds and goldfinches are also found along the proposed route.

Construction and maintenance of power lines on new ROW might impact wildlife by destroying their habitat. Also, soil erosion can degrade rivers and wetlands that provide habitat.

Because the alternative route requires clearing and disturbance of forest and wetland areas, nuisance species could be introduced during construction and maintenance of the new line. One example would be the unintentional spread of purple loosestrife into wet areas. Construction practices could be employed to avoid introducing nuisance species. Prior inspections to determine the presence and removal of invasive species after construction could avoid degradation of vegetation communities. If new infestations are identified after construction, plant removal prior to seed dispersal should be accomplished with methods recommended by the DNR.

The Wisconsin NHI indicates that no threatened or endangered species are known to occur along the New ROW Route.

Water resources and wetlands

If the Freedom site were selected, the New ROW Route would cross 23 feet (affecting 0.1 acre) of wetland on segment D. There would also be 111 feet (affecting 0.4 acre) crossed on segment G. Both of these wetlands could be spanned. The New ROW Route would also cross forested wetlands on segments C, E and G. The total length of forested wetland affected would be 470 feet, or approximately 2.1 acres of wetland. The trees in these wetlands would be cleared, and the character of the wetlands in the New ROW Route would be changed. If heavy construction equipment is used to clear trees in these areas, compaction of wetland soils could alter the hydrology of these areas causing long-term detrimental effects.

The New ROW Route would not result in any new water crossings. On segment F, the new line would share the Existing ROW Route as it crosses the Fox River.

If the Kaukauna site were selected, the New ROW Route would cross 111 feet (affecting 0.4 acres) of wetland area on segment G. If the No-Loop Solution were selected, this alternative route would also cross forested wetlands on segments C and E. The total forested wetland that could be impacted would be approximately 416 feet, totaling an area of 1.9 acres.

Existing local community resources and potential impacts

Site history

Historically, much of the land proposed for the alternative transmission route has been farmed for the last two centuries. In 1949, 1960, and 1965, Michigan Wisconsin Pipeline Company was granted approval to construct, maintain, and operate a gas or oil pipeline. In 1965, WEPCO was granted authority to construct, maintain, and operate two electric power lines in the area. More single-family homes have begun to populate the area along roads in recent years.

Consistency with current and planned land use

Both the town of Kaukauna zoning ordinance and the Outagamie County zoning ordinance classify lands along the proposed alternative transmission line as agricultural. Public utility installations are listed as "Permitted Accessory Uses and Structures" under the Outagamie County zoning ordinance. The construction of the transmission line as proposed does not appear to cause any major conflict with the land use plan since there are several transmission lines and natural gas pipelines already crossing the area.

Agriculture and other land use issues

If the Kaukauna site were chosen, the New ROW Route would cross about 12 miles of farmland, potentially impacting approximately 225 acres on, at least, a short-term basis. If the Freedom site were chosen, this alternative would cross about 13.5 miles of farmland, potentially affecting 244 acres during construction.

In addition to a reduction in agricultural land available for farming due to structure placement, the new transmission lines could also increase the cost of field operations and lower field

property value by presenting new obstacles for farm operators to negotiate with field equipment. The new line and its associated structures could also adversely affect the potential for irrigation, aerial spraying, windbreaks, and future land development.

Construction equipment in the ROW could compact soil, increase chances of run-off and erosion, and reduce subsequent crop yields. In order to mitigate impacts, construction could be done in the months when crops are not present or when fields are frozen. Spans might be altered so that transmission facilities could be placed as close to field edges as possible or so as to avoid plow headlands.

If the Commission were to approve a transmission line route that involved construction of new transmission, the Commission could consider including provisions in its order that grant some or all of the landowner rights listed in Wis. Stat. §§ 182.017(7)c-h, discussed in the section on agriculture and other land use issues for the Existing ROW Route. However, if the new transmission is approved and built on the New ROW Route, the law would automatically apply.

Residences

Table 5-4 shows that there are nine residences and one commercial building within 300 feet of the centerline along the New ROW Route. Possible adverse environmental impact could include interference by noise from the use of construction equipment, property value losses, fear of health risks, effects on landscaping, and visual impacts of the new facility.

Table 5-4 Residences and commercial buildings within 300 feet of the transmission centerline

Segment/Distance	0-25	25-50	50-100	100-150	150-300
D	0	0	0	0	0
C	0	0	0	1-commercial	4-residence
E	0	0	0	0	4-residence
G	0	0	0	0	1-residence

Roads, railroads, and other utilities

To make the necessary connections to the transmission grid, the new transmission line must cross several major roads and highways, a railroad track, existing transmission lines, and a natural gas pipeline. The northern New ROW Route between the power plant sites would cross the same roads as the Existing ROW Route but at different places. The existing lines would not be removed.

Possible environmental impacts could include delays in traffic flow during construction. Larger structures might be needed to gain necessary vertical clearance.

Visual landscape

If the line were built along the New ROW Route, it could affect the visual landscape by: 1) removing resources such as trees and shrubs along the ROW, 2) degrading resources by

creating a ROW through otherwise intact woodlands, or 3) degrading the surrounding environment with unpleasant views of transmission poles and wires. During construction, the visual landscape would change as the existing trees were removed from the area where the transmission line would be built. The changes to the visual landscape would consist of a new set of tall structures with three large electric conductor cables and other wires. The new line would be in addition to those already crossing this portion of Outagamie County. According to ATC, disturbed areas would be restored after construction was complete. No large trees would be allowed to grow in the transmission line ROW.

Noise

Potential noise impacts would be the same as those discussed earlier for the Existing ROW Route. As with the Existing ROW Route, there are no residences within 150 feet of the proposed centerline. There would be temporary noise from heavy equipment during construction.

Historic and archeological sites

In accordance with Wis. Stat. § 44.40, a data search was done to identify the presence or absence of any historical or archeological sites that would be affected by transmission line construction. According to the WHS listings, one known archeological site, a burial ground, exists along the New ROW Route. It is not known yet whether this site is located in the proposed ROW or whether it is farther away and safe from construction impacts. The WHS would determine the potential for adverse impact if this route were selected by the Commission.

If adverse impact to the site is expected and the Commission selects the New ROW Route routing, the WHS would be consulted about construction in the area. The Commission order authorizing construction and ATC, as the builder of the line, would need to follow the WHS's direction.

Because of the federal permits and approvals required for the plant, Fox Energy or ATC compliance with Section 106 of the NHPA would also be needed. Depending on WHS determinations under this law, compliance might involve field surveys along portions of the New ROW Route that have not yet been field surveyed or disturbed already to a depth of at least four feet.

General, Nonroute-related Electric Issues

Magnetic fields (EMF)

Human health and EMF

Electricity produces two types of fields; an electric field and a magnetic field. These fields are also called electromagnetic fields or EMF. Since the late 1970's, concern has primarily focused on the magnetic field, so today when people talk about EMF they generally are referring only to the magnetic field. The EMF produced when we use electricity is a small portion of the greater

electromagnetic spectrum. Power line magnetic fields are in the Extremely Low Frequency (ELF) range of the spectrum. The energy in these magnetic fields is very small. For instance, EMF from appliances and power lines does not have enough energy to break molecular bonds. However, cells can respond to exposure to these low energy fields. These responses, or biological effects, tend to be indirect. It has not been shown that these indirect effects cause health problems.

Electric current moving in a conductor creates magnetic fields. As the current increases, so does the magnetic field. The magnetic field decreases as the distance from the source increases. The size of the magnetic field cannot be predicted from the voltage. It is not uncommon for a 69 kV (69,000 volt) line to have a higher magnetic field than a 115 kV (115,000 volt) line. The fields encountered in everyday life are measured in milligauss (mG).

Higher magnetic field levels are generally found in:

1. Urban versus rural areas
2. Duplexes or apartments versus single-family homes
3. Old homes versus new homes
4. Houses with grounding to a metallic waterline that is connected to the city main
5. Houses with knob-and-tube wiring
6. Houses with two-prong versus three-prong outlets
7. Houses with air conditioning
8. Small residences versus large residences
9. High-density versus low-density residential areas

Concern about exposure to power frequency EMF has developed because a number of epidemiological[21] studies have found a statistical association between exposure to power frequency magnetic fields and human health effects. Other epidemiological studies, however, have shown no such association. Because of this inconsistency in the findings of epidemiological research this issue has become quite controversial. Unlike laboratory research where investigators have total control over study conditions, epidemiologists must observe the world as it is, and must draw inferences from information observed or collected about a study population's life, habits, and exposure to disease agents. Unfortunately, it is not uncommon for studies to suffer from weaknesses in study design or failure to account for confounding factors. It is seldom possible to compare exposed populations to unexposed populations or low and high exposures. Because the results of a study are statistical estimates, researchers must present a range over which they are confident the estimate is reliable. One would expect that with a

[21] Epidemiology is that branch of medicine that deals with the study of ranges, distribution, and control of disease in populations. It usually involves field studies of patterns and statistical associations.

serious health threat the studies would show a consistent and strong positive association with human health effects. For EMF this has not been the case.

Because epidemiological studies result in statistical associations rather than direct evidence of cause and effect, other scientific work must be conducted before scientists can determine that statistical associations from epidemiological studies actually reflect a cause and effect relationship. On one hand, scientists must develop a plausible biological mechanism for how such an exposure might cause disease. On the other hand, because a number of epidemiological studies identified an association of EMF with leukemia, laboratory studies on mice exposed to EMF need to be conducted to show that exposure to EMF does cause disease. Until recently, few studies on animal carcinogenesis and EMF have been conducted. The long-term animal studies conducted to date have not shown evidence that long-term exposure to EMF causes cancer and more specifically no link was found to leukemia, brain cancer, and breast cancer. So far, EMF studies showing some evidence of carcinogenic activity have studied levels of EMF much higher than those associated with power lines. To date, no plausible biological mechanism has been discovered that could explain how exposure to low-energy power frequency EMF might cause human disease.

In the 1990s, the National Academy of Sciences to review the literature on the health effects from exposure to EMF. A 16-member committee composed of scientists and other experts concluded that scientific evidence did not show that exposure to EMF presents a human health hazard. It did not cover occupational exposure studies. There was also still a concern because of the persistence of findings from a number of studies that show a weak association between residential power line configurations and childhood leukemia. At this time, it is unknown what may be the cause of such an association. Continued research focusing on the specific causes of this link to childhood leukemia has been recommended. There also appears to be a need for more research into the relationship between high exposures to EMF and breast cancer in animals already exposed to other carcinogens.

The National Institute of Environmental Health Sciences (NIEHS) issued a report recommending that EMF be classified as a Class 2B possible carcinogen. This was not a determination of carcinogenicity. Rather, an item must be placed in Class 2B if there is inadequate epidemiological evidence and insufficient animal data supporting carcinogenicity. The NIEHS report stated that the probability that EMF exposure is truly a health hazard is small but that, because of weak scientific evidence that exposure may pose a leukemia hazard, it does warrant aggressive regulatory concern. The NIEHS has continued to study and evaluate EMF because, while scientific consensus appears to be forming, there are still some unanswered questions about EMF exposure and human health.

Commission policy and EMF

The Commission continues to consider EMF in its power line siting decisions, but it must balance the likelihood of health effects from exposure to power line EMF with issues of need, cost, and environmental impact. It bases its EMF policy on a continuing review of scientific research.

Since 1989, the Commission has periodically reviewed the science on EMF and has held hearings to consider the topic of EMF and human health effects. The most recent hearings on EMF were held in July 1998. As a result of these hearings, the Commission ordered Wisconsin utilities to:

1. Contribute to the national EMF research effort.
2. Provide information to the public on EMF, perform EMF measurements for customers upon request, and develop (with Commission staff guidance) a uniform EMF measurement protocol.
3. Evaluate and include information on how magnetic fields differ for alternative power line configurations in construction applications.
4. Create a database on magnetic fields around representative distribution and transmission facilities.
5. Consider the number of persons exposed to EMF along proposed transmission line routes and the intensity and duration of exposure.
6. Submit a list of homes, workplaces, hospitals, nursing homes, day-care centers, and schools near proposed and alternate transmission line routes.
7. Credit energy conservation programs that reduce current flow throughout the electrical system for their ability to minimize exposure to EMF.

For major transmission construction projects, the Commission requires utilities to provide estimates of the size of the magnetic field created by the proposed line and structure designs and the distance and number of buildings within 300 feet of each proposed line route. Commission staff checks the developer's calculations of the estimated magnetic field produced by the proposed line and then analyzes each route for potential exposure to magnetic fields. This information is then used in route selection decisions made by the Commission.

Magnetic field estimates

Commission staff has verified the accuracy of the EMF calculations submitted by Fox Energy There appear to be substantial differences in the estimated levels of EMF along segments and between segments, both on the Existing ROW Route and the New ROW Route, but among all the estimates, the same patterns exist. The differences in EMF estimates are related to differences in the configurations of the wires due to the use of various types of transmission structures.

Existing ROW Route

Magnetic fields, as estimated, would decrease with increasing distance away from the new and existing transmission lines. The strength of the magnetic field would be strongest directly under the transmission line, the transmission centerline. At normal electrical current levels, the EMF along the Existing ROW route would peak under the new line at about 50 mG if the Loop interconnection option is used. If the No Loop option is used, the peak EMF under the line at

normal current levels would be about 70 to 120 mG on the connection to North Appleton and about 20 to 30 mG on the connection to Forest Junction.

New ROW Route

Along the New ROW Route, with only the new 345 kV line, the peak EMF under the line would be about 60 to100 mG. Moving away from the centerline, the magnetic field would attenuate with distance, rapidly at first and then more gradually, until the magnetic field is reduced to near ambient or normal background values, generally within about 300 feet of the lines. Regardless of connection option or route, the EMF estimates appear to decrease to less than 5 mG within 300 feet of the centerlines.

Electric safety

Safety standards

Transmission lines must meet the requirements of the Wisconsin State Electric Code.[22] The code establishes design and operating standards, and sets minimum distances between wires, poles, the ground, and buildings. Although the code represents the minimum standards for safety, the electric utility industry's construction standards are generally more stringent than Wisconsin State Electric Code requirements.

Wis. Admin. Code § 114.234 prohibits the construction of transmission lines over residential dwellings, swimming pools, wells, or above ground uncovered fuel storage tanks. Although they may not be prohibited by code, building other structures within a transmission ROW is strongly discouraged.

Contact with transmission lines

The most significant risk of injury from any power line would be the danger of electrical contact between an object on the ground and an energized conductor. However, contact with transmission lines is less of a problem than contact with distribution lines or service drops because the state electrical code requires a minimum of 24.5 feet of ground clearance for transmission lines. In addition, transmission lines are designed to trip out of service (become de-energized) automatically and immediately if they fall. Individuals with specific concerns about whether it is safe to operate farm equipment in a particular location under the line should contact ATC directly.

Induced voltages

Farm operators often express concerns about shocks from metal objects in the immediate vicinity of an overhead transmission line. An ungrounded metal object (like a tractor or fence) under or very near an energized transmission line may become charged with low-level, 60-Hz,

[22] Wisconsin adopts the most recent edition of the National Electric Safety Code (NESC-1997) with certain changes, deletions and additions. Volume 1 of the Wisconsin State Electrical Code is found in Wis. Admin. Code. ch. PSC 114. It is administered primarily by the Commission.

AC voltages by an electrostatic induction process. A person touching the object may feel a shock similar to that felt after crossing a carpet and then touching a metal object. The voltage discharge can be a painful nuisance. The magnitude and strength of a charge is directly related to the mass of the ungrounded metal object and its orientation to the line. Utilities' experience with induced voltage concerns related to existing 345 kV transmission lines has been very limited to date. Fences directly under and in parallel to transmission lines should be grounded to earth. Field equipment beneath the line could drag a short metal chain from the insulated equipment to "ground" the equipment to earth.

Stray voltage and dairy livestock

Stray voltage has been studied in many research projects at accredited universities over the past 20 years. These projects have examined the causes and effects of various levels of stray voltage, and means for mitigating the effects.

Stray voltage is an electrical phenomenon that can often be found at low levels between two animal contact points at any livestock confinement where electricity is grounded. Electrical systems, including farm systems and utility distribution systems, must be grounded to the earth according to the National Electric Safety Code (NESC) to ensure safety and reliability.[23] Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When NEV is measured between two objects that may be simultaneously contacted by an animal, it is considered stray voltage.

Low levels of AC voltage on the grounded conductors of a farm wiring system are a normal and unavoidable consequence of operating electrical farm equipment. The key is in understanding what levels of stray voltage do and do not affect farm operations. Stray voltage often is not noticeable to humans, yet may be felt by an animal. For example, a dairy cow, while standing on the earth or a concrete floor, may feel a small electric shock when it makes contact with something that is energized, such as a feeder or water bowl.

Dairy cow behaviors that may indicate the presence of stray voltage include nervousness at milking time, increased defecation or urination during milking, hesitation in approaching waterers or feeders, or eagerness to leave the barn. A stray voltage problem may be reflected in increased milking time and in uneven milking, sometimes with decreased milk production. Some problems erroneously associated with stray voltage are increased mastitis and milk-withholding problems on farms with milking parlors or in barns with milk pipelines. Many other non-electrical farm factors cause these symptoms.

[23] Wis. Adm. Code § PSC 114-096C requires a primary neutral ground at every pole in rural areas, for new construction. The intended purpose is to improve grounding in rural areas.

Measurement of any voltages or current flow in livestock confinement areas can be done using established testing procedures with appropriate equipment.[24] Mitigation of any such currents can be achieved through a variety of proven and acceptable means, such as additional grounding or the installation of an equipotential plane or isolation if necessary.

The PSC formed the Wisconsin Rural Electric Power Services (REPS) program to conduct on-farm investigations and collect data. The PSC ordered the major investor-owned Wisconsin utilities to record findings from their stray voltage investigations and release these findings to the PSC. The Department of Agriculture, Trade and Consumer Protection (DATCP) also has a stray voltage unit. It provides a veterinarian to the REPS program and provides information to farmers about how to reduce stray voltage if high levels are found on the farm.

The PSC established a stray voltage "level of concern," in 1996 of two milliamps.[25] The "level of concern" is not intended as a damage level. Rather, two milliamps is a very conservative, pre-injury level, below the point where moderate avoidance behavior is likely to occur and well below where a cow's behavior or milk production would be affected. The PSC and DATCP consider that this level of voltage/current is an amount of electricity where some form of mitigative action should be taken on the farmer's behalf, although only a small percentage of cows may perceive its presence.

The "level of concern" is further defined with respect to how it should be reduced. If a utility distribution system contributes one milliamp or more to stray voltage on a farm, the utility must take corrective action to reduce its contribution to below the one milliamp level. Further, if the farm electrical system contributes more than one milliamp, the farmer may want to consider taking corrective measures to reduce the level below one milliamp.

[24] Commission staff recently issued a White Paper Report: Measurement Protocols - Facts and Misconceptions. This white paper discusses established testing methodologies for stray voltage investigations. The white paper, along with other pertinent stray voltage documents, is available via the Commission's website at the following address: http/www.psc.state.wi.us/electric/newsinfo/strayvol.htm.

[25] In PSC docket 05-EI-115 the level of concern was established at 2 milliamps, AC rms (root mean squared), steady state or 1 volt AC rms steady state across a 500 ohm resistor in the cow contact area. Steady state is defined by the Institute of Electrical and Electronics Engineers (IEEE) as the value of current or voltage after all transients have decayed to negligible value.

6

Chapter 6 – Overview of the Proposal and Required Decisions

Approval, Denial, or Modification of Proposed Plan

CPCN requirements

The Commission has the obligation to approve, deny, or modify Fox Energy's proposal to build the plant, and to issue an order to that effect with appropriate conditions added. The Commission also has the obligation to approve, deny, or modify ATC's proposal to build the connecting electric transmission line.

Wis. Stat. § 196.491(3) requires the Commission to make the following determinations before approving construction of the Fox Energy project as a wholesale merchant plant:

1. Under Wis. Stat. § 196.491(3)(d)3, the plant must have a design and location that is in the public interest considering:
    a. Alternative locations
    b. Individual hardships
    c. Safety
    d. Reliability
    e. Environmental factors
2. Under Wis. Stat. § 196.491(3)(d)4, the plant must not have undue adverse impact on other environmental values such as, but not limited to:
    a. Ecological balance
    b. Public health and welfare
    c. Historic sites
    d. Geological formations
    e. Aesthetics of land and water
    f. Recreational use

3. Under Wis. Stat. § 196.491(3)(d)6, the plant must not unreasonably interfere with the orderly land use and development plans for the area involved.
4. Under Wis. Stat. § 196.491(3)(d)7, the plant must not have a material adverse impact on competition in the relevant wholesale electric service market.

All of the above items have been considered and described at least to some extent for the proposed power plant in this EIS. Since the proposal is a wholesale merchant plant, the Commission may not consider the effects of alternative sources of supply, engineering or economic factors, or Fox Energy's profitability. The Commission may discuss the potential effects of the project on Wisconsin's energy supply. Economics may need to be considered to determine direct or indirect impacts on safety, reliability, ecological balance, public health and welfare, orderly land use and development, and effects on competition. As such, these direct and indirect impacts have also been discussed in this final EIS.

All of the items listed above for the proposed power plant must also be considered for the proposed transmission line. In addition, since ATC is a utility in Wisconsin, the Commission must also determine that the design and route for the transmission line are in the public interest considering alternative connection technologies and other engineering and economic factors.

Alternative power plant locations

Two alternative locations have been proposed, and the process used by Fox Energy for narrowing its choices from six original sites to the two in Freedom and Kaukauna has been described. Both sites address, to varying degrees, the public interest, environmental values, and consistency with orderly local development. However, the Commission must decide whether they do this adequately. Site selection is discussed further below.

Alternative technologies or actions

No Action alternative

Taking no action on this application, by denying the application, would result in no change in the number of power plants in the state. Electricity providers would have the same sources of electricity available as they have currently.

Taking no action on this application, by not making a final commission decision, would result in automatically granting a CPCN to the applicants under Wis. Stat. § 196.491 (3)(g). The applicant would then have the option of constructing the plant at either of the two proposed sites. The necessary transmission interconnection could also be built because an automatic CPCN would also be granted to ATC.

Technology alternatives

As discussed in Chapter 2, Wis. Stat. §§ 1.12 and 196.025 require the Commission to give priority to specific methods of meeting energy demands, to the extent these methods are "cost-effective and

technically feasible." The Commission must consider options based on the following priorities, in the order listed, for all energy-related decisions:

1. Energy conservation and efficiency.
2. Noncombustible renewable energy resources.
3. Combustible renewable energy resources.
4. Nonrenewable combustible energy resources, again in the order listed.
   a. Natural gas.
   b. Oil or coal with a sulfur content of less than 1 percent.
   c. All other carbon-based fuels.

If the Commission identifies an option to the proposed power plant during this review that is cost-effective and technically feasible, it could reject the Fox Energy project as proposed. It could not, however, order Fox Energy to build something else in its place.

Market power

Wis. Stat. § 196.491(3)(d)7 states that the Commission must find that the Fox Energy project "will not have a material adverse impact on competition in the relevant wholesale electric service market." As discussed in the section on Market Power in Chapter 2, the Commission will have to consider Fox Energy as a new entrant into the highly concentrated wholesale market of the WUMS region.

Selection of the Site for the Plant

Commission site selection

Two alternative sites for the plant have been proposed. If the Commission determines that both sites are reasonable and viable, it will select one of them as part of the approval of the plant.

The two sites are discussed in detail in Chapters 3 and 4. They are briefly compared in terms of public interest and environmental values in Table 6-1.

Table 6-1 Comparisons between the two proposed power plant sites for public interest and environmental values

Siting Factor	Freedom	Kaukauna
Air	Appears permittable	Appears permittable
Land	Relatively flat farmland	Relatively flat farmland
Water on site	Drainage controlled, environmental corridor passes through site; stream tributaries off-site	Drainage controlled; stream tributaries off-site
Vegetation	Corn and soybeans plus water-hydrophytic plants	Corn
Land use	Farmland; surrounded by farmland	Farmland; surrounded by farmland
Roads	Some congestion on CTH UU and CTH 55 during construction; impacts minimal during operation	Some congestion on CTH U, USH 41 frontage road, Wrightstown Road, and STH 96 during construction; impacts minimal during operation
Fogging and icing potential	2.5-4.5 hours per year fogging along about 1,300 feet of STH 55; 15 minutes-5.5 hours per year icing along about 2,300 feet of STH 55	2.5-10.5 hours per year fogging along about 2,000 feet of STH 96; 15 minutes-3.5 hours per year icing along about 2,300 feet of STH 96
Noise potential	More than 48 dBA at some of the closest receptors; would not comply with EPA guidelines without mitigation in addition to equipment upgrades. No low frequency vibration expected	More than 48 dBA at closest receptors; would not comply with EPA guidelines without mitigation in addition to equipment upgrades. No low frequency vibration expected
Visual impacts	Not in character with existing landscape	Not in character with existing landscape
Historic sites	No historical or archeological sites	No historical or archeological sites
Economic effects	Some jobs; some materials purchased; shared revenue payments to Outagamie County and town of Freedom	Some jobs, some materials purchased; shared revenue payments to Outagamie County and town of Kaukauna
Natural gas	On-site connection	Connection 230 feet east of site
Electric transmission	See Table 6-4 below	See Table 6-4 below
Water supply and discharge	Raw water supply from HOV, 5.8 miles; discharge in Fox River, 3.2 or 7.5 miles of new water discharge line	Raw water supply from the HOV, 3.7 miles; discharge in Fox River; 1,500 feet of water discharge line
Sewer	On site	On site

DNR air permit

As discussed in Chapters 1, 3, and 4, an approved air permit is necessary from the DNR before construction may begin at either site. If a site could not be permitted, the project would not move forward.

Water supply construction authorizations

If either the Freedom or the Kaukauna site is selected, Fox Energy would have to secure the necessary permits from the DNR and the ACOE. Chapter 30 permits, from the DNR, and Section 404 and Section 10 permits, from the ACOE, would be required for each site in order to construct raw water supply and waste water discharge structures from each site to the Fox River. No other water supply and discharge alternatives were proposed. The water resource impacts, to the extent known, are detailed in Chapters 3 and 4. If the permits could not be obtained, the project would not move forward.

Water pipeline impacts

The landscape and pipeline route options are all very similar in terms of the natural environment affected. No special resources, communities, or environments exist on any of the pipeline routes. A comparison of overall impacts might indicate what water pipeline routes are likely to have the least overall impact. For the Freedom Site, the discharge water pipeline routes would share some portion of their routes with the supply pipeline, which could help reduce impacts.

The number of stream crossings for the water pipelines are shown in Table 6-2. The water pipelines for the Kaukauna Site require two wetland and stream crossings, while the pipelines for the Freedom site, depending on the route selected, would result in either seven or twelve stream crossings.

Table 6-2 Freedom site and Kaukauna site comparison of wetland and stream crossings for pipeline routes

Pipeline Route	Number of Wetland & Stream Crossings	Combined Wetland & Stream Crossings for Supply and Discharge Pipelines
Freedom-supply pipeline	5	NA
Freedom-discharge pipeline-Alt #1	8	12
Freedom-discharge pipeline Alt #2	7	7
Kaukauna – supply pipeline	2	NA
Kaukauna– discharge pipeline	0	2

A summary of several potential impact categories for the water pipelines for both sites can be found in Table 6-3. The pipelines for the Kaukauna site would be shorter and affect far fewer total acres. In each category, the Kaukauna pipelines would appear to result in fewer miles of pipeline and impact fewer acres of farmland, residential property, commercial properties, and wetlands.

Table 6-3 A comparison of water supply and discharge pipeline impacts

	Routes				
	Freedom Supply Line	**Freedom Discharge Line Alternate #1**	**Freedom Discharge Line Alternate #2**	**Kaukauna Supply Line**	**Kaukauna Discharge Line**
Impacts					
Ag (acres)	17.5	38.7	12	11	1.6
Ag (%)	49	85	54	48	70
Residential (acres)	9.5	5.7	4	4.2	0
Residential (%)	27	13	19	23	0
Commercial (acres)	5.6	0	0	0.8	0
Commercial (%)	22	0	0	3.7	0
Wetland (acres)	0.38	0.44	1.1	0.14	0.2
Wetland (%)	1	0.5	0.5	1	9
Forest (acres)	0.4	0.6	5.8	5.6	0.5
Forest (%)	1	1	26	24	21
Total acres	33.38	45.44	22.9	22.74	2.3
Total length (miles) new ROW	5.8	7	3.2	3.7	0.4

Discharge pipeline figures do not include impacts shared with the water supply pipeline

Natural Gas Pipeline Connections

As discussed in detail in Chapters 1, 3 and 4, Fox Energy would build the natural gas line to connect the plant to a gas supply. At the Freedom site, the line would be entirely on the site. At the Kaukauna site, most of the line would be on the plant site, but about 230 feet would extend beyond the site. In either case, the line would be authorized by the Commission as part of the CPCN.

The natural gas metering station required for use of either site would be built by ANR with authorization by the FERC.

Selection of the Electric Transmission Line Solution and Route

The project would require connection to the existing electric transmission system via a new 345 kV transmission line. The 345 kV transmission line connection would be up to 12.5 miles of overhead line on existing ROW, or up to 16 miles of overhead line on new ROW. Therefore, the transmission line requires a CPCN from the Commission. The same determinations must be

made under Wis. Stat. § 196.491(3)(d) before the Commission may issue a CPCN approving the transmission connection. The CPCN would be granted to ATC.

Two solutions have been proposed for the electric transmission connection from either site. One solution, the "Loop" solution, would connect the plant to the North Appleton Substation from either site by looping into the existing PBNA 345 kV line and require new line construction only to the Forest Junction Substation. The other solution, the "No Loop" solution, would require new transmission line construction to each substation. For either solution at each site, new transmission could be constructed on an Existing ROW Route or New ROW Route. The Commission must approve the connection design and select the route to be used to connect the approved site. If the transmission from one site is technically or environmentally more favorable than the connection from the other, the transmission may be an important factor in the Commission's power plant site selection.

The two proposed transmission line routes are described in detail in Chapter 5. Table 6-4 briefly compares and contrasts the routes in terms of public interest and environmental values.

Table 6-4 Environmental comparison among the four proposed electric transmission routes for public interest and environmental values

Route Factor	Freedom		Kaukauna	
	Existing ROW	**New ROW**	**Existing ROW**	**New ROW**
Site location through ROW	Farmland, residential and roadways	Farmland, mostly	Farmland, residential and roadways	Farmland, mostly
Length	With North Appleton Loop: about 9 miles; No Loop: about 13 miles	With North Appleton Loop: about 13 miles; No Loop: about 18 miles	With North Appleton Loop: about 5 miles; No Loop: about 13 miles	With North Appleton Loop: about 62 miles; No Loop: about 16 miles
Soils	Silty loam, silty clay loam, fine sandy loam	Silty loam, silty clay loam, fine sandy loam	Silty loam, silty clay loam, fine sandy loam	Silty loam, silty clay loam, fine sandy loam
Geology	No effect	No effect	No effect	No effect
Wetlands	About 2 acres of ROW is wetland: several stream crossings	2.5 acres of ROW is wetland; stream crossing	About 2 acres of ROW is wetland; several stream crossings	More than 2.5 acres is wetland; stream crossing
Vegetation and wildlife	No significant impact on species	Significant reduction in trees, forest crops	No significant impact on species	Significant reduction in crop and woodland acreage
Existing contamination	None	None	None	None
Consistency with land use	Compatible	Compatible	Compatible	Compatible

Route Factor	Freedom		Kaukauna	
	Existing ROW	**New ROW**	**Existing ROW**	**New ROW**
Roads and utility lines	Some traffic disruption; some attention to other utilities needed	Some traffic disruption; some attention to other utilities and gas company	Some traffic disruption; some attention to other utilities needed	Some traffic disruption; some attention to other utilities and gas company
Visual landscape	Two existing lines present; one would be rebuilt taller	New transmission line feature in countryside	Two existing lines present; one would be rebuilt taller.	New transmission line feature in countryside.
Historic properties	Nothing listed	Nothing listed	Nothing listed	Nothing listed
Noise	Open area – acceptable	Open area - acceptable	Open area- acceptable	Open area – acceptable
EMF	Moderate to high levels	New high to moderate levels where none were before	Moderate to high levels	New moderate to high levels where none were before
Aesthetics	Little impact	New impact – new feature on landscape	Little impact	New impact – new feature on landscape

Summary

The Commission has a CPCN application before it for a wholesale merchant electric power plant and for connecting electric transmission and natural gas lines to operate the plant. It must issue an order on whether to approve the plant and lines, and under what conditions. The Commission's deadline for issuing an order is October 22, 2002. If the plant is approved, the Commission must also approve either the Freedom or Kaukauna site. For whichever site is selected, the Commission must approve an electric transmission line route, and decide under what conditions it would be built and operated. If the Freedom site is selected, the Commission must select a route for the water discharge line.

A

Appendix A – Comments on the Initial and Supplemental Draft EIS

Initial Comment Process

The Commission staff issued the initial draft EIS on the Fox Energy project in March 2001. A 45-day comment period followed the issuance of this draft EIS. The comment period ended on May 29, 2001. Thirty-two letters and e-mail messages were received. They are summarized below with Commission and DNR staff responses by topic.

In August 2001, Fox Energy and ATC withdrew the CPCN application for the Fox Energy Center and associated transmission facilities. Fox Energy wished to investigate a different water supply source for the power plant.

The applications were re-submitted in spring of 2002 and deemed to be complete on April 25, 2002. The Commission resumed its review of the applications and issued a supplemental draft EIS in June 2002. The supplemental draft EIS covered all of the aspects of the original project plus the new proposal to draw water from the HOV facility.

The 45-day comment period for the supplemental draft EIS ended on July 26, 2002. Eleven letters and three e-mail comments were received during the comment period on the supplemental draft EIS. Those comments are also summarized in this Appendix with Commission and DNR staff responses.

All comments (on the initial draft EIS and the supplemental draft EIS) were considered in the preparation of this final EIS. Many of the comments relate to the ultimate decisions that the Commissioners will make. The final EIS does not directly address those comments.

The public hearing on October 3, 202, in Appleton will provide an opportunity to comment on policy matters, state law, individual hardships, and the Commissioners' final project decisions.

Comment Letters Received on the Initial Draft EIS

Letters and e-mail messages were received from the following persons:

Commenter	Items of Concern
Cara L. Bartley	Visual and noise impacts; decreased air quality, increased fogging, EMF
Elizabeth Bastian	Location of plant; increased noise, air pollution, and disruption of neighborhood
Gloria Behrendt	Water withdrawal from Fox River; increasing use of natural gas; devaluation of properties; stray voltage; EMF; increased noise; distance error on p. 69
Jean Behrendt	Increased noise and air pollution; fogging and icing; power sales
Todd Bruss	Health hazards; increased noise and air pollution; stray voltage; fogging and icing
Chad Doverspike, representing the Brown County Port and Solid Waste Department	Impacts of transmission line on planned landfill
James Gonnering, Sr.	Correction regarding number of homes within ½ mile of plant; health issues; land devaluation; stray voltage; power sales
Mary Jane Gonnering	Correction regarding number of homes within ½ mile of plant; health issues; land devaluation; stray voltage; power sales
Sandi Hillegas	Land devaluation; increased noise and air pollution; stray voltage; icing; impacts on availability of fresh country air
John C. Howard, representing the Fox Valley Sierra Group, and Penny Bernard Schaber, representing the John Muir Chapter of the Sierra Club	Necessity of plant; power sales; conservation and more environmentally friendly sources to solve need; impact of removing water from the Fox River; fogging; air pollution; location of plant; compatibility with surroundings; aesthetic impacts; increased noise
Beata Huss	Location of plant; stray voltage; loss of water from Fox River; fogging and icing; increased noise
Rosemary and Glenn Huss	Location of plant; stray voltage; EMF; stack emissions; cooling tower emissions; devaluation of property
Russell Huss	Cooling tower plume; stray voltage; location of plant
Denis and Connie Lamers	Induced current from transmission (shocks and effects on livestock
Richard and Patricia Merbach	Effects of transmission line on property's streams and wetland; aesthetic impacts; devaluation of property; disagrees with "would not cause a major conflict with current and future land use" statement in DEIS
Bill and Ginny Moehring	Increase in noise; health concerns
Steve and Cindy Nysse	Health hazards; increased noise and air pollution; stray voltage; fogging and icing
Gary L. Pahl	Location of plant; withdrawal of water from the Fox River; effects of releasing vapor to atmosphere, fogging, icing, etc; mixing of hazardous chemicals at

Commenter	Items of Concern
	the facility and informing the public of hazardous chemical leaks; effects of transmission right-of-way
Stephen Parker, representing the American Transmission Company	Clarification of figures in DEIS transmission chapter; transmission lines and farm field work; EMF studies now completed; preferred transmission solution and route
Jean Reffke	Location of plant; health hazards; increased noise and air pollution; stray voltage, fogging and icing
Kurt Reffke	Location of plant; health hazards; increased noise and air pollution; stray voltage, fogging and icing
Steve Reffke	Location of plant; health hazards; increased noise and air pollution; stray voltage, fogging and icing
Tom and Diane Sanderfoot	Location of plant; increased noise; EMF; potential for damage to area trees and wetlands
Dale D. and Nancy Schmidt, Robert Schmidt, and Alan D. Six	Location of plant; withdrawal of water from the Fox River; effects of releasing vapor to atmosphere, fogging, icing, etc; mixing of hazardous chemicals at the facility and informing the public of hazardous chemical leaks; effects of transmission right-of-way
Donald E. Simpson	Locate plant closer to water source; agricultural concerns
Thomas and Barbara Van Asten	Stack emissions and health concerns; stray voltage; increased noise; location of plant
Clyde Van Dera	Location of plant; fogging; increased noise and air pollution; aesthetic concerns; property devaluation
Mary Van Dera	Location of plant; stray voltage; land devaluation; fogging and icing; increased noise
Steve Van Dera	Location of plant; increased noise; EMF; stack emissions
Marc Van Patten, representing Fox Energy Company LLC	Errors to correct in characterization of the applicant and the project; updates on applicant activities performed since the DEIS; indications of additional information expected to be submitted
Dan and Carl Vosters	Stray voltage; increased transmission lines on landscape; devaluation of property
Joseph M. Weyers	Loss of vapor through cooling towers and waste of steam produced

Responses to Comments

The comments of all respondents were appreciated and were taken into consideration. Some comments led staff to revise portions of the EIS. Others were noted in anticipation of citizen testimony at the hearing to come. Some factual errors in the initial draft EIS were identified by commenters and by PSC and DNR staff, and an attempt was made to correct them.

PSC and DNR responses to concerns identified in the comment letters and e-mails follow according to comment subject.

Air quality

The discussion in the initial draft EIS on air quality impacts was modified with new information from the DNR Bureau of Air Management.

More comments concerning decreased air quality were received from landowners near the Freedom site than the Kaukauna site. Concerns about air quality appeared to be tied closely to the quiet rural nature and fresh country air of the local landscape. That concern has been noted.

The emissions from the plant would be controlled under the authority of federal and state clean air laws. That level of control is meant to protect public health and welfare.

Compatibility with existing zoning and land uses

The land use and zoning sections of Chapters 3 (Freedom site) and 4 (Kaukauna site) were updated.

Conservation or more environmentally friendly sources of energy

The concern about the need for more meaningful conservation efforts and more environmentally friendly sources of energy was added to the section in Chapter 2 on Commission energy priority requirements.

Cooling tower plume, fogging, and icing

Many of the comments expressed concerns about increased fogging and icing. These concerns have been noted. The draft and supplemental draft EISs describe the potential for fogging and icing on nearby roads at each site.

Some comments indicated concerns about the loss of water through the cooling towers as a plume. Those concerns also have been noted.

The discussions in the draft EIS concerning the cooling tower plume and its potential impacts were modified based on new information from Fox Energy.

Devaluation of local properties

Concerns about devaluation of the land and other property have been noted. It is impossible for the Commission to address property devaluation in a quantitative, predictive way. While some research exists, the situation is always very site-specific. No discussion on the subject was added. Public testimony at the hearing could clarify individual hardships for the record and the Commissioners' review.

Disruption of the neighborhood

This concern has been noted.

Electric transmission right-of-way

The concerns have been noted. A discussion of the potential impacts on the Brown County landfill land was added to the sections on potential impacts in Chapter 5. Potential impacts on

wetlands, woodlands, and agriculture were discussed. In response to one concern, a statement about conflict with current and future land use was modified.

EMF

The discussion on magnetic fields was modified with new information from ATC. The concerns expressed about potential EMF effects have been noted.

The Commission has closely followed research on magnetic fields for many years and has found no scientific work documenting the ionization of stack emissions by magnetic fields from power lines. No additional discussion on this subject was added.

Hazardous chemicals

The concerns have been noted. The discussion in the draft and supplemental draft EIS identifies the hazardous chemicals brought on site during construction and operation, and their formulation and uses. Regulations enforced by the DNR and other agencies require appropriate spill and leak control, and the proposed plant would comply. The regulations also require appropriate notification. The discussion describes how the company and community offices would set the stage for appropriate notification.

Health concerns

Health concerns were expressed in the comments related to potential health issues resulting from air pollutant emissions and EMF. Human health is the foundation for the air quality laws and standards enforced by the DNR. Potential human health impacts of EMF are discussed in the EIS. The concerns expressed by the commenters have been noted.

Homes, farms, etc., within one-half mile

The draft and supplemental draft EISs both indicate the number of homes within a half-mile radius of the Freedom site and the distances to the nearest schools or hospitals. At the hearing, local residents can describe farms, daycare facilities, and other entities within or beyond that radius about which they are particularly concerned.

Induced current from the transmission line

Some text was added to this supplemental draft EIS discussing the potential for induced current from the line and its implications.

Landfill

The Brown County Port and Solid Waste Department raised two concerns about the placement of the new transmission line. The first concern assumed new construction along the existing Forest Junction transmission (DEFJ) ROW. No new construction would occur under this project in that ROW. The second concern was about new transmission line construction perpendicular into the DEFJ ROW. The proposed route would pass through an area where Brown County has a 117-acre parcel slated to become a landfill. It appears that the new line would have to relocated some distance to the north. Some cooperation with Brown County would be necessary, and precise locations can be clarified during the project hearing.

Location of the plant

The EIS is meant to delineate and disclose the potential impacts on the environment at the proposed sites. Most of the comments expressed concern that the Freedom site is a rural agricultural landscape that is inappropriate for a power plant, and construction of the facility would disrupt the relatively quiet environment and the neighborhood. Many of the comments indicated that an industrial park would be a better site. These comments would be best expressed as public testimony at the project hearing. However, the Commission cannot order Fox Energy to build the plant in an industrial park. It can only select one of the two proposed sites or reject both.

Natural gas use

The discussion in the initial draft EIS about the increasing use of natural gas was modified to acknowledge that the potential for impact existed but that it would be a result of the addition of numerous plants and other users around the country and not simply the result of adding the Fox Energy plant.

Noise

Concerns about noise from the plant have been noted. The comments that expressed concern about noise impacts were more representative of the area around the Freedom site than the area around the Kaukauna site. A statement was added in the noise sections of Chapters 3 and 4 related to the concerns of close neighbors about the potential for the plant noise to annoy.

Power sales elsewhere/necessity of the plant

It is true that the plant would be able to sell its power on the open wholesale market. The concerns about where the electricity would be sold have been noted. The Commission does not have direct jurisdiction over where Fox Energy would sell its electricity.

Stray voltage

Stray voltage is an important concern among Wisconsin dairy farmers. However, it is not expected to result from this project.

The initial draft EIS did not address the issue, so additional text was added about stray voltage and its potential impacts. The additional text is in the sections on agricultural impacts for each site in Chapters 3 and 4, and in Chapter 5 under potential impacts of the new transmission lines.

Veal calves

No text was added about veal calves in particular, but citizen testimony at the hearing could describe the calves' need that may be endangered by building the proposed plant nearby.

Visual impacts

The discussion in the initial draft EIS about potential visual impacts of the project was not modified, but the concerns have been noted. The commenters indicating that visual impacts are a concern represent the area around the Freedom site more than the area around the Kaukauna site.

Water loss from the Fox River

The concerns about the water withdrawal from the Fox River have been noted. The applicant has changed its proposed water supply source from the Fox River to HOV. However, some water from the HOV that would have been discharged into the Fox River would be instead evaporated through the power plant's cooling towers. New discussion of the water issue can be found in Chapters 2, 3, and 4.

The withdrawal of water is regulated under the DNR discharge and intake permits.

Comment Letters Received on the Supplemental Draft EIS

Six commenters sent a form letter with 34 points of concern about the supplemental draft EIS. That form letter is referenced in the table below. Letters and e-mail messages were received from the following persons:

Commenter	Items of Concern
"Concerns, Comments, Corrections" form letter - submitted by several citizens as indicated below.	34 items of concern in this letter fall under the following categories: • double-circuit vs. single-circuit structures • Fox River water levels • noise levels, fogging, and icing from Kaukauna site • long-term health and environmental effects of using gray water, including the potential for airborne pathogens like Legionnaires' Disease • potential for excess moisture and associated problems in area • increased concentrations of chemical constituents in discharge to Fox River • power sales; who experiences visual impacts • proximity of Kaukauna site to vulnerable populations and features • air quality • suitability of site soils • water pipeline impact prevention • effects on nearby municipality services • new golf course and housing subdivision near Kaukauna site • location of plant • need for easement adjustments on Existing ROW route • stream crossings and wetlands on New ROW route • transmission line design to ensure safety • health concerns, property devaluation, and restrictions on how lands can be developed near plant

Commenter	Items of Concern
	• appearance of plant from outside • appearance of transmission structures • induced voltages and stray voltage
Stephen, Holly, Autumn, and Ella Diny	Impacts of additional transmission line on land, including EMF; Concerns, Comments, Corrections letter
William G. Feldkamp	Water usage; water released into the air; dampness effects on crops and health
Scott and Mary Heiting	Potential impacts of the two transmission routes, especially depiction of the New ROW route; disruption of local living environment, effects on area homes
Denis, Connie, and Jon Lamers	Effects of additional H-frame structures in field; stray current; effects of moisture on health, road safety, hay; effect on bald eagles; Concerns, Comments, Corrections letter
Mark and Lynn Lamers	Health effects of transmission lines; stray voltage; materials used to preserve wooden H-frame structures; Concerns, Comments, Corrections letter
Ted and Janice Lamers	Concerns, Comments, Corrections letter
Richard and Patricia Merbach	Depiction of the New ROW route, including need for better discussion of woodlands, wetlands, and consistency with local land use
Gary L. and Judith Pahl	Concerns, Comments, Corrections letter; materials used to preserve wooden H-frame structures
Stephen Parker, representing American Transmission Company	Corrections to description of North Appleton Loop and route distances; clarifications of transmission in plant layout figures; clarifications of routing options; clarifications about interconnection
Bob Schmidt	Concerns, Comments, Corrections letter; road icing; suitability of soils; effects on nature and wildlife
Dale and Nancy Schmidt	Impact of runoff on public/private wells, nesting bald eagles, warmer water impact on fish, icing and fogging, effects of cooling tower and evaporation, property values, H-poles vs. single poles, prior easement contract on use of chemicals in ROWs.
Ben Sisson, representing MidAmerican Energy Holdings Company and Fox Energy Company LLC	Corrections, clarifications, and adjustments in characterization of the applicant and the proposed project
Alan and Lynn Six	Concerns, Comments, Corrections letter
Scott and Patty Van Den Heuvel	Fogging and icing on roads; effects of cooling tower evaporation and noise on Thousand Island Refuge and local bald eagle population; visual and EMF effects of additional H-frame structures; where the electricity is being sold

Responses to Comments

The comments of all respondents were appreciated and were taken into consideration in the preparation of this document. Some comments led staff to revise portions of the EIS. Others were noted in anticipation of citizen testimony at the hearing to come. Some factual errors in

the supplemental draft EIS were identified by commenters and by PSC and DNR staff, and an attempt was made to correct them.

PSC and DNR responses to concerns identified in the comment letters and e-mails follow according to comment subject.

Air quality

The DNR air pollution control construction permit will limit the number of starts and stops per unit time. The company is seeking to obtain enough power purchase contracts to enable it to operate the plant optimally within the limitations of the air permit.

Less polluting alternatives are discussed in Chapter 2. The only way at this time to generate electricity with less pollution would be using noncombustible renewable resource generation like wind or solar power, or possibly some biomass combustion combined with cropping to sequester carbon dioxide. With a merchant plant proposal such as this one, the Commission can examine only the proposed technology.

Clarifications in content of EIS

Most of the clarifications in text of the supplemental draft EIS suggested by the two applicants, Fox Energy and ATC, were incorporated in the text of this final EIS.

Compatibility with existing land uses

Staff agrees that compatibility with local governmental land use plans does not necessarily indicate compatibility with the plans of individual landholders. Some landowners would be impacted to a greater degree than others with the additional transmission on their land, depending on the size of the land parcel and their plans for it. Citizens should testify about their individual hardships at the public hearing.

Cooling tower design

Although Fox Energy concludes that wet/dry cooling, which could reduce the potential for fogging and icing, is infeasible, wet/dry cooling was proposed and approved for the Badger Generating plant in Kenosha County. The descriptions of how the wet/dry system would work have been removed from the original draft EIS. No alteration has been made for the final EIS.

The decision to use the proposed (wet) cooling tower technology appears to be, in part, a choice that balances efficient use of non-renewable fuel resources and greater power output against the use of larger quantities of water. The water mass balance diagram on page 34 of the supplemental draft EIS shows a water discharge to the Fox River of between 0.9 and 1.1 MGD. A wet/dry or dry system would use less water but would also result in a parasitic power loss on the power plant thereby reducing the efficiency of the plant. The loss of water to the Fox River system is calculated to be less than 1 percent of the seven-day, ten-year low flow for the river.

Cooling tower plume - moisture from the air, fogging, icing

Some water droplets would form from the cooling towers. The proposed towers are designed for "low drift" so only a small amount of water will actually be in the form of unevaporated water droplets that could precipitate to the ground. These unevaporated droplets would fall

within a few hundred feet of the towers. The evaporated water would rise rapidly into the atmosphere and be dispersed with the wind, eventually forming clouds. Because of rapid dispersal, water vapor from the cooling towers is not expected to significantly increase moisture levels in or around homes.

The potential for molding from moisture in the local air is very small. Normally, the moisture would stay in the gaseous state for great distances. The visible fog would occur seldom and for only short periods of time.

Road hazards due to fogging and icing were discussed in the supplemental draft EIS, and these discussions were retained in the final EIS. The majority of the commenters on this subject during the most recent comment period were located near the Kaukauna site rather than the Freedom site.

Devaluation of local properties

The Commission does not make estimates of the valuation or devaluation of properties near proposed projects. The research on the subject does not yet allow confident prediction. Citizens can describe their particular hardships at the hearing.

Disruption of the neighborhood

General disruptions are discussed in the EIS. Specific concerns about disruptions should be described by citizens during the hearing.

Eagles, nature and wildlife, and Thousand Island Refuge

There should be no adverse impacts on resident eagles, and there could, in fact, be some enhancement of their feeding opportunities. Eagles commonly utilize sites along the downside of dams because the water movement keeps the river open all year long. Fish have a tendency to concentrate near these rapids for food sources too, making it an ideal site for eagles to forage. Adding the warmer waters from the plant and the site above would enhance food sources and the attraction for eagles to concentrate. The island area to the south of the dam has always been a foraging site during mild winters and throughout the year. Trees offer roosting sites as well as perches to observe prey along the river. Eagles are tolerant of the Fox River manufacturing plants, paper industry, treatment plants, and other businesses as evidenced by their nests which are located very close by.

Figure 4-5 shows a prediction of about 2.5 hours per year of fogging confined to an area that would include about 990 feet of shoreline. It would not include any of the Thousand Island Refuge.

Electric transmission additions on fields

Additional electric transmission structures could add restrictions to existing field use. Land users should testify about their particular situations at the hearing so that they are reflected in the record. Anyone operating a daycare that has not yet been identified and could be affected should also testify if possible.

Electric transmission ROW and easements

The ROW easement is a private contract, and the Commission has no direct jurisdiction in the matter. However, it would be appropriate for landowners to reexamine their existing easements to see if project changes would occur that require or allow renegotiation. Citizen testimony could clarify concerns for the record. Personal hardship is one of the items considered by the Commission when it makes a determination on whether to issue a CPCN.

Electric transmission structure choice

Comments on structure preferences have been noted. Citizen testimony can add to the record at the public hearing on the project, and citizens might submit and comment on the Osmose Material Safety Data Sheet (MSDS) at that time. (There are numerous MSDSs related to the power plant itself, but they are not included per se in the EIS.)

EMF

The potential impacts of EMF and ways to address it are both discussed in Chapter 5.

Fox River water levels

The concerns about the effects on Fox River levels have been noted. Some water from the HOV, regardless of the HOV's water sources, would be evaporated through the cooling towers instead of being discharged into the Fox River.

Fox River discharge

The water discharged to the Fox River from the Fox Energy project would have a 4 to 5 fold increase in the concentration of chemical constituents in the HOV effluent. However, the mass of constituents would remain the same, or even be somewhat reduced by the cold lime softening system as they pass through the power plant. Furthermore, when added to the total volume of water in the Fox River, the chemical constituents would be rapidly diluted and would not exceed Fox River water quality criteria. Nevertheless, the DNR WPDES permit would require monitoring for several chemical constituents (see supplemental draft EIS pages 36-39).

Homes and farms in proximity to the site

Additions to the text in Chapters 4 and 5 have been made to indicate the proximity of the golf course, business park, and expected new residential areas north of the Kaukauna site. Citizen testimony could provide more information at the public hearing.

Any case for compensation to landowners adjacent to the selected site would also have to be made during easement negotiations for connecting facilities.

HOV effluent use in cooling towers - potential health effects

The water supplied to the Fox Energy project would be of the same quality that HOV currently discharges into the Fox River. The HOV effluent has been chlorinated. Upon arrival at the Fox Energy facility, the water would receive additional treatment. This treatment includes additional chlorination to kill biological organisms and a cold lime softening process that reduces suspended solids (see page 33 of the final EIS). The water would then be stored in a covered storage facility to reduce the growth of algae in the stored water. Prior to going to the cooling

tower, the water would be halogenated with brominated compound. The brominated compound is a biocide to kill organisms that might grow on the cooling tower. A halogenated biocide residual would be maintained in the cooling tower to provide continuous treatment to prevent the buildup of a biofilm, or slime, on cooling tower surfaces.

Pathogens would become airborne from a cooling tower as a result of a buildup of biomass on the tower cooling media, normally a result of poor maintenance of tower water chemistry. The treatment measures described above are designed to ensure that no such fouling occurs. The company would have an additional incentive to do this because any measurable growth on the cooling media would also cause a serious decrease in heat rejection capacity and would have a significant negative impact on plant operations.

HOV effluent use in cooling towers - Legionnaires' Disease

Special concern has been raised about the potential for Legionnaires' Disease or legionellosis. Legionellosis is caused by inhalation of the legionella bacteria, in particular *Legionella pneumophila*. This bacteria is widely distributed in water systems and is frequently found growing in biofilms or slime on the surfaces of lakes, rivers, and streams. One place where legionella can grow is on a power plant cooling tower. The potential for these bacteria to grow remains regardless of whether the water used comes from surface waters, wells, or treated water from a sewage district. Bacterial growth can be prevented through proper maintenance, testing, and cleaning of the cooling tower.

Johns Hopkins Hospital Epidemiology and Infection Control Department has made the following recommendations for maintenance of legionella-free cooling towers.

- An outside contractor together with the project operator should evaluate and treat cooling tower water.
- pH levels should be monitored daily.
- Tests for bacteria should be performed weekly.
- Biocide levels should be monitored weekly by the contractor and a minimum of three times weekly by the facility operator.
- Legionella tests should be sent out to an independent lab quarterly.
- If legionella is identified in the water, the towers should be decontaminated.

Guidance for maintaining legionella-free cooling towers can also be obtained from the federal Occupational Safety and Health Administration (OSHA), the Cooling Technology Institute (CTI), and the Wisconsin Division of Health.

With proper maintenance and testing, there are no significant human health impacts expected from this project, either in the short or long term.

Location of the plant

Comments on location of the plant in the Freedom-Kaukauna area have been noted. Citizen testimony can add to the record at the public hearing. For a merchant plant proposal such as this one, the Commission may consider only the sites proposed.

Municipal service impacts

Although compensation to other towns, villages, or cities for fire service is not discussed in the EIS, the local services have indicated that no additional charges need to be made to cover them for either site as discussed in the EIS. The towns are responsible for their mutual aid agreements.

Noise

The discussion in the EIS accounts for homes and recreational areas that already exist. New project developers always should assess the appropriateness of their neighbors before developing.

Submitted noise models do not indicate echo effects through the river valley. Additional information that may help the Commission understand noise effects can be offered by citizens at the public hearing.

Power sales elsewhere

It is true that the plant would be able to sell its power on the open wholesale market. The concerns about where the electricity would be sold have been noted. The Commission does not have direct jurisdiction over where Fox Energy would sell its electricity.

Soil suitability

The suitability of the soils is discussed for each site, in Chapters 3 and 4. The Commission will base its decisions about the appropriateness of either site based on the EIS and the hearing record.

Stray voltage, induced current, and electric safety

Stray voltage and induced current are important concerns among Wisconsin farmers. Electric safety is a concern of everyone. The EIS discusses stray voltage, induced current, and electric safety, and their potential effects and mitigation.

Stream crossings by electric transmission

ATC has been contacted to provide a better inventory of stream and wetland crossings for the New ROW route. They should have completed this work by the time of the project hearing.

Visual impacts

Lighting at the plant is discussed in the EIS.

The discussion in the EIS accounts for potential visual impacts on homes and recreational areas that already exist. New project developers always should assess the appropriateness of their neighbors before developing.

Water pipeline

Two sites are under review for this project. In Chapter 6 a comparison of water supply and water discharge pipeline impacts can be found in Table 6-3. This table shows that the Kaukauna Site would require fewer overall miles of water discharge and supply pipeline when compared to the Freedom Site. This suggests the Kaukauna Site would have fewer overall impacts to residents resulting from water pipeline construction.

This project may not be built without all the necessary permits and approvals. To the extent possible, the applicant proposes to use public ROW. A discussion on the use of public ROW for this project can be found on pages 75 and 116, in Chapters 3 and 4, of the final EIS under the heading **Pipeline ROW**. Impacts to wetlands can be reduced by boring under stream and river beds. This has been proposed by the applicant.

B

Appendix B- Acronyms

Abbreviation or Acronym	Definition
AAC	Acceptable Ambient Concentration
ACOE	Army Corps of Engineers
ANR	ANR Pipeline Company
ATC	American Transmission Company
BACT	Best available control technology
BER	Bureau of Endangered Resources
BMP	Best Management Practices
BTU	British thermal unit
CA	Certificate of Authority
CAA	Clean Air Act
CBOD	Carbonaceous biochemical oxygen demand
Cfs	Cubic feet per second
CO	Carbon monoxide
CO_2	Carbon dioxide
Commission or PSC	Public Service Commission of Wisconsin
CPCN	Certificate of Public Convenience and Necessity
CT	Combustion Turbine
CTH	County Trunk Highway
DATCP	Department of Agriculture, Trade and Consumer Protection
dB	Decibels
dBA	Sound levels measured in decibels using the A-weighted scale
dBC	Sound levels measured in decibels using the C-weighted scale
DEFJ	De-energized Forest Junction
DNR	Department of Natural Resources
DSM	Demand-side management
DOT	Department of Transportation
Dth	Dekatherm
EIS	Environmental impact statement
ELF	Extremely Low Frequency
EMF	Electromagnetic fields
EPA	Environmental Protection Agency
FAC	Free available chlorine
FERC	Federal Energy Regulatory Commission

Abbreviation or Acronym	Definition
FIRM	Flood Insurance Rate Map
gpm	Gallons per minute
HAP	Hazardous air pollutant
HCl	Hydrochloric acid
HDPE	High-density polyethylene
HOV	Heart of the Valley Metropolitan Sewerage District
HRSG	Heat recovery steam generator
Hz	Hertz
IES	Illuminating Engineering Society
KKSS	Kaukauna Substation
kV	Kilovolts
kWh	Kilowatt-hour
L_{dn}	Day-night sound level
lbs.	Pounds
LEPC	Local emergency planning coordinator
LHV	Low Heating Value
MACT	Maximum achievable control technology
MAOP	Maximum allowable operating pressure
mG	Milligauss
MGD	Million gallons per day
MMBTu	Million British thermal units
MSDS	Material safety data sheets
MSL	Mean sea level
MW	Megawatts
NAAQS	National Ambient Air Quality Standards
NER	Northeast Region
NESC	National Electric Safety Code
NEV	Neutral to earth voltage
NIEHS	National Institute of Environmental Health Sciences
NHI	Natural Heritage Inventory
NHPA	National Historic Preservation Act
NO_x	Nitrogen oxide
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
OSHA	Occupational Safety and Health Administration
OWS	Oil/water separator
PBNA	Point Beach-North Appleton
PCB	Polychlorinated biphenyl compounds
pH	Acidity
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in diameter
ppmvd	Parts per million volume dry basis
PSC or Commission	Public Service Commission of Wisconsin
PSD	Prevention of significant deterioration

Abbreviation or Acronym	Definition
Psi	Pounds per square inch
Psig	Pounds per square inch gauge
PSS	Power system stabilizer
RAPID	Research and Public Information Dissemination
REPS	Rural Electric Power Services
ROW	Right-of-way
RPM	Revolutions per minute
SACTI	Seasonal annual cooling tower plume impact
SCR	Selective catalytic reduction
SO_2	Sulfur dioxide
STH	State Trunk Highway
Tpy	Tons per year
TSP	Total suspended particulates
TSS	Total suspended solids
$\mu g/m^3$	Micrograms per cubic meter
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile organic compounds
WCL	Wisconsin Central Limited
WEPA	Wisconsin Environmental Policy Act
WEPCO	Wisconsin Electric Power Company
WHS	Wisconsin Historical Society
WPDES	Wisconsin Pollution Discharge Elimination System
WPSC	Wisconsin Public Service Corporation
WUMS	Wisconsin Upper Michigan System
WWI	Wisconsin Wetland Inventory